

**CLASS 392, ELECTRIC RESISTANCE HEATING DEVICES****SUBCLASSES****301 Borehole type:**

This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device comprising an electrical resistance heating element is disclosed for use in an elongated hole in the earth.

- (1) Note. The patents classified here are for electrical oil well heaters, per se. The combination of a heater and sufficient well structure is in Class 166.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclass 45 for geos:graphical heat exchange.  
 166, Wells, subclasses 57+ and 272.1+ for well apparatus comprising a heater in the well and see subclass 60 for the line between Classes 166 and 219. See, also, (1) Note above.  
 175, Boring or Penetrating the Earth, subclasses 16+ for an electrical heating process or device for forming a hole in the earth by directly applying heat to fluidize or comminute the material forming the earth.  
 299, Mining or In Situ Disintegration of Hard Material, subclasses 3+ for mining by in situ conversion of solid to fluid and which includes heating means or steps and subclass 14 for process of directly applying heat.  
 405, Hydraulic and Earth Engineering, subclass 131 for temperature modification or control of earthen formation by heating.  
 432, Heating, subclass 62 for geos:graphic or structural installation.

**302 With heat exchange fluid:**

This subclass is indented under subclass 301. Subject matter wherein the heating device comprises a fluid which is heated by the heating element, and the heated fluid conveys its heat to the well or bore.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 357, for intermediate heat absorber.  
 456, for heat exchange fluid line connected heated storage tank.  
 496, for continuous fluid heater.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclasses 104.11+ for intermediate fluent heat exchange material receiving and discharging heat.

**303 With vapor generator:**

This subclass is indented under subclass 301. Subject matter wherein the heating device includes means for converting a substance from a solid or liquid to a gaseous state.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 324+, for fluid-in-circuit circuit type heater.  
 342, for vaporization by stored heat.  
 386+, for vaporizer.

**304 Heating element surrounding delivery pipe:**

This subclass is indented under subclass 301. Subject matter wherein the heating element encircles an outer surface of a tube inserted into the well for conveying fluid into or out of the well.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 468+, for pipeline tracing fluid heater.  
 472, for flexible hose type fluid heater.  
 479+, for externally heated line connected section for fluid heater.

**305 Suspended by cable in well:**

This subclass is indented under subclass 301. Subject matter wherein the heating device is supported from a well-head by a flexible line-like member.

**306 Plural separate heating devices:**

This subclass is indented under subclass 301. Subject matter wherein the borehole contains two or more heating devices spaced from one another so that heating devices can heat different portions of the borehole.

**307 Combined with nonelectric heating means (e.g., gas, etc.):**

This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device comprises an electrical heating element in combination with at least one other heat source of a nonelectrical nature, e.g., gas, etc.

- (1) Note. The other heat source may be utilized either simultaneously or alternately with the electrical device.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclass 601 for inductive heating with diverse type heating; for microwave heating see subclass 679 with a diverse device and subclasses 680+ with diverse-type heating.
- 432, Heating, subclass 94 for disparate heat sources or fuels.

**308 For heating liquid:**

This subclass is indented under subclass 307. Subject matter wherein the heating device is for heating a substance in that state in which the particles move freely among themselves but without tendency to separate.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 311+, for heating liquid by fluid-in-circuit type heater.
- 441+, for tank or container type liquid heater.
- 465+, for continuous flow type fluid heater.

**SEE OR SEARCH CLASS:**

- 122, Liquid Heaters and Vaporizers, appropriate subclasses for liquid heaters and vaporizers.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 344 through 363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace.

- 165, Heat Exchange, appropriate subclasses for heating liquid by utilizing heat exchange.

- 237, Heating Systems, appropriate subclasses for heating liquid by heating systems.

**309 Hot plate:**

This subclass is indented under subclass 307. Subject matter wherein the heating device includes means on which a removable vessel is to be heated.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 467, for hot plate of a continuous flow type fluid heater.

**SEE OR SEARCH CLASS:**

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers.
- 126, Stoves and Furnaces, appropriate subclasses for hot plate type.
- 219, Electric Heating, subclasses 443.1+ for an exposed planar support surface for material to be heated (e.g., hot plate, etc.).

**310 Oven type:**

This subclass is indented under subclass 307. Subject matter wherein the heating device includes an enclosed chamber for containing the material to be heated.

**SEE OR SEARCH CLASS:**

- 126, Stoves and Furnaces, subclasses 273+ for oven.
- 219, Electric Heating, subclasses 678+ for microwave heating, and subclasses 391+ for electrically heated ovens.

**311 Fluid-in-circuit type heater:**

This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device includes an electrically conductive fluid, e.g., water, heated by passing an electric current directly through the conductive fluid between two or more spaced conductors in electrical contact with the fluid, whereby the conductive fluid itself acts as an electric resistance element.

## SEE OR SEARCH CLASS:

- 34, Drying and Gas or Vapor Contact With Solids, subclasses 245+ for material subjected to electrical energy.
- 99, Foods and Beverages: Apparatus, subclass 358 for electrode type and subclass 451 for electric, radiant or vibrational treating means.
- 122, Liquid Heaters and Vaporizers, using means other than electricity to generate heat, subclasses 13.01 through 19.2 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.).
- 201, Distillation: Processes, Thermolytic, subclass 19 for applying electric energy directly to material.
- 210, Liquid Purification or Separation, subclass 748 for utilizing electrical or wave energy directly applied to liquid.
- 219, Electric Heating, subclasses 600+ for inductive heating, note subclass 628 heat exchange by fluid or liquid; subclasses 678+ for microwave heating, note subclass 687 for a fluid heater; and subclasses 764+ for capacitive dielectric heating.
- 338, Electrical Resistors, subclasses 80+ for liquid resistance element.
- 373, Industrial Electric Heating Furnaces, subclasses 29+ for joule effect heating and subclasses 120+ for charge internal resistance heating.
- 426, Foods or Edible Material: Processes, Compositions, and Products, subclasses 234+ for passage of electric current through food material.

**312 Method:**

This subclass is indented under subclass 311. Subject matter comprising processes for heating fluid by utilizing the liquid itself as an electrical resistance and passing electrical energy therethrough.

## SEE OR SEARCH CLASS:

- 426, Foods or Edible Material: Processes, Compositions, and Products, subclasses 237+ for direct application of electrical or wave energy to food material and, particularly, subclasses 244+ for involving dielectric heating or passage of electric current through food material.

**313 Portable:**

This subclass is indented under subclass 311. Subject matter wherein the fluid-in-circuit heater may be lifted or carried bodily from place-to-place by hand.

## SEE OR SEARCH CLASS:

- 219, Electric Heating, subclass 523 for housing, casing or support insertable into material or support to be heated.

**314 Continuous flow of fluid being heated:**

This subclass is indented under subclass 311. Subject matter wherein the fluid-in-circuit heater comprises a flow path for the uninterrupted flow of fluid to be heated, an inlet connected to a pressurized source of fluid and the electrodes arranged with the fluid flow path for heating the fluid while it uninterruptedly flows through the path.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 396+, for continuous flow line connected heater for vaporizer.
- 465+, for continuous flow type fluid heater.

**315 With means to adjust current path between electrodes:**

This subclass is indented under subclass 314. Subject matter including means to vary the effective length or cross-sectional area of the current flow between the electrodes.

- (1) Note. Generally the varying of the current path results in varying the resistance of the path and consequently the magnitude of the current.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 323, for reservoir or tank.
- 329, for line connected boiler.

334, for manually filled tank or container.

**SEE OR SEARCH CLASS:**

338, Electrical Resistors, subclasses 80+ for mechanically variable or adjustable liquid resistors.

**316 Responsive to condition of fluid:**

This subclass is indented under subclass 315. Subject matter wherein the continuous fluid-in-circuit heater includes means which senses and responds to the fluid to adjust the current path between the electrodes.

**317 Movable dielectric means:**

This subclass is indented under subclass 315. Subject matter wherein the current path is adjusted by a shiftable electrical insulation means interposed between or surrounding the electrodes whereby the passage of current between the electrodes may be controlled.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

330, for adjusting current path between electrodes in line connected boiler.

**SEE OR SEARCH CLASS:**

338, Electrical Resistors, subclass 82 for fluid resistance devices with an adjustable insulating barrier between electrodes.

**318 Current control means:**

This subclass is indented under subclass 314. Subject matter wherein the fluid-in-circuit heater includes means to vary the flow of electrical current between an external source of current and the heating device.

**SEE OR SEARCH CLASS:**

219, Electric Heating, subclasses 507+ for significant current connection means for heating devices in general under the class definition.

**319 With discharge member for line or tank:**

This subclass is indented under subclass 314. Subject matter wherein the continuous fluid-in-circuit heater includes means defining a passage or vent for permitting the fluid to flow out of a supply line or receptacle.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

473+, for fluid heater with discharge member.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclasses 334+ for systems with heating or cooling.  
222, Dispensing, subclasses 146.1+ for fluid dispensing with heating.  
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for means for heating or cooling the system or fluid, and particularly 133 for spray member having heater.  
604, Surgery, subclass 113 and 114 for means for electrically cooling or heating body.

**320 Tube or pipe forms flow path:**

This subclass is indented under subclass 314. Subject matter wherein the flow path for the fluid to be heated comprises a fluid conveying elongated tubular member.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

397+, for continuous flow line connected heater for vaporizer.  
480+, for externally heated line connected section.  
486, for heated line section with heating element internal of flow path.  
488+, for pipe or tube forming flow path with heating element internal of flow path.

**321 Pipe forms at least one electrode:**

This subclass is indented under subclass 320. Subject matter wherein the pipe structure comprises at least one of the electrodes.

**322 With reservoir or tank:**

This subclass is indented under subclass 311. Subject matter wherein fluid-in-circuit heater includes a container for heating a fixed quantity of fluid held therein.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

400+, for vaporizer.  
441+, for container type liquid heater.

## SEE OR SEARCH CLASS:

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers with a liquid supply, subclass 358 for an electrode type cooking device, subclasses 403+ for cooking devices of the boiler or deep-fat fryer type, and subclass 451 for a device that subjects food to an electric or high-frequency energy.
- 122, Liquid Heaters and Vaporizers, appropriate subclasses for water heaters utilizing a boiler type tank, particularly subclasses 13.1+ for stand boiler.
- 137, Fluid Handling, subclass 334 for systems utilizing electric heating means and which may utilize tanks.

**323 With means to adjust current path between electrodes:**

This subclass is indented under subclass 322. Subject matter including means to vary the effective length or cross-sectional area of the current flow between the electrodes.

- (1) Note. Generally the varying of the current path by subject matter of this subclass type results in varying the resistance of the path and consequently the magnitude of the current.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 315, for continuous flow of fluid being heated.
- 329, for line connected boiler.
- 334, for manually filled tank or container.

## SEE OR SEARCH CLASS:

- 338, Electrical Resistors, particularly subclasses 80+ for mechanically variable or adjustable liquid resistors.

**324 Steam or vapor generator:**

This subclass is indented under subclass 311. Subject matter wherein the fluid-in-circuit heater includes means for converting a fluid material to a vapor or gas state.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 303, for borehole type heater.
- 342, for vaporization by stored heat.

386+, for vaporizer.

## SEE OR SEARCH CLASS:

- 4, Baths, Closets, Sinks, and Spittoons, subclasses 524+ and 535+ for means for applying vapor in a bath.
- 38, Textiles: Ironing or Smoothing, subclass 69 and 77.1+ for steam iron.
- 43, Fishing, Trapping, and Vermin Destroying, subclasses 125+ for vaporizers in fumigating apparatus.
- 48, Gas: Heating and Illuminating, subclasses 89+ and 103 for retort by electric heater.
- 122, Liquid Heaters and Vaporizers, appropriate subclasses for apparatus for generating vapors from liquids and further utilizing the vapors thus generated, e.g., steam generator. The structure found in this class is very similar to those found in Class 219, especially the so-called flashers in subclasses 40+ and wick in subclass 366.
- 123, Internal-Combustion Engines, subclasses 434+ and 543+ for charge forming devices involving vaporizers.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 20 through 20.2 for a cooking stove having an oven heated by steam or hot water, subclasses 369-369.3 for a steam chamber for food, or subclasses 377.1-392.1 for an open-top liquid heating vessel that may include a lid having a confining, directing or shielding feature for a liquid or steam used to heat the vessel.
- 128, Surgery, subclasses 203.12+ for vaporizers for medicaments.
- 132, Toilet, subclass 228 and 272 for hair shaping curls by steam.
- 159, Concentrating Evaporators, appropriate subclasses for devices for the concentration of solids held in solution or suspension by evaporation.
- 196, Mineral Oils: Apparatus, subclass 104 for vaporizing mineral oil, and subclasses 121 for electric heating.
- 201, Distillation: Processes, Thermolytic, subclass 19 for applying electrical energy directly to material.

- 202, Distillation: Apparatus, appropriate subclasses for distillation apparatus in general.
- 203, Distillation: Processes, Separatory, appropriate subclasses for a process of distilling a liquid.
- 208, Mineral Oils: Processes and Products, classes 313 and 347+ for a process of distilling mineral oils.
- 223, Apparel Apparatus, subclass 51 for apparel apparatus by heating and steaming.
- 237, Heating Systems, subclass 9, 16+, and 67 for heating systems by steam.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 136 for sprays with means to generate a water vapor or steam.
- 252, Compositions, subclasses 67+ for specific compositions useful for vaporization purposes.
- 261, Gas and Liquid Contact Apparatus, subclasses 127+ for external supply or removal of heat and subclass 142 for heat produced by electricity.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 305 for fume generating apparatus and 292+ for sterilizers using steam.
- 431, Combustion, subclass 208 and 258 for a fuel burner having an electrically heated fuel vaporizer.
- 516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 1+ for continuous gas or vapor phase colloid system (e.g., smoke, fog, aerosol, cloud, mist) or agents for such systems or making or stabilizing such systems or agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.
- 607, Surgery: Light, Thermal, and Electrical Application, subclasses 81+ for bathing apparatus.
- 325 Line connected boiler:**  
This subclass is indented under subclass 324. Subject matter wherein the fluid-in-circuit heater includes a vessel having an inlet for receiving water from an external source of supply and an outlet for discharging vapor from the vessel.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
400+, for vaporizing in-line connected tank.  
449, for liquid heating container or tank.
- 326 Control of electrode immersion level:**  
This subclass is indented under subclass 325. Subject matter wherein the boiler includes means to control the depth of the electrode immersed in the water to be heated.
- SEE OR SEARCH CLASS:  
338, Electrical Resistors, subclasses 80+ and 86 for level of liquid element adjustable on electrodes.
- 327 By electrode current:**  
This subclass is indented under subclass 326. Subject matter wherein the electrode immersion level is controlled by the magnitude of current flow between the electrodes.
- 328 By pressure:**  
This subclass is indented under subclass 326. Subject matter wherein the electrode immersion level is controlled by the exertion of force of vapor in the boiler.
- SEE OR SEARCH CLASS:  
219, Electric Heating, subclass 496 for heaters in general with current control responsive to the pressure of the medium being heated.  
338, Electrical Resistors, subclass 38 for fluid pressure responsive to liquid element resistors.
- 329 With means to adjust current path between electrodes:**  
This subclass is indented under subclass 325. Subject matter including means to vary the effective length or cross-sectional area of the current flow between the electrodes.
- (1) Note. Generally the varying of the current path results in varying the resistance of the path and consequently the magnitude of the current.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 315, for continuous flow of fluid being heated.
- 322, for reservoir or tank.
- 334, for manually filled tank or container.

SEE OR SEARCH CLASS:

- 323, Electricity: Power Supply or Regulation Systems, subclass 296 for voltage or current regulating systems utilizing liquid resistors.
- 338, Electrical Resistors, particularly subclasses 80+ for mechanically variable or adjustable liquid resistors.
- 373, Industrial Electric Heating Furnaces, subclass 29 and 120+ for electric furnace structure including adjustable electrodes.

### 330 Movable dielectric means:

This subclass is indented under subclass 329. Subject matter wherein the current path is adjusted by a shiftable electrical insulation means interposed between or surrounding the electrodes whereby the passage of current between the electrodes may be controlled.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 317, for continuous flow of fluid being heated.

SEE OR SEARCH CLASS:

- 338, Electrical Resistors, subclass 82 for fluid resistance devices with an adjustable insulating barrier between electrodes.

### 331 Electrode arrangement:

This subclass is indented under subclass 325. Subject matter including details of the manner in which the conductors are arranged to distribute the current in-line connected boiler.

SEE OR SEARCH CLASS:

- 373, Industrial Electric Heating Furnaces, subclasses 29+ and 120+ for electrode details of electric heating furnaces.

### 332 Water jet electrode:

This subclass is indented under subclass 331. Subject matter wherein the electrode arrangement includes one electrode which spurts out a stream of water directed at another electrode.

### 333 Manually filled tank or container:

This subclass is indented under subclass 324. Subject matter wherein the vapor generator includes a vessel with an opening through which the vessel is filled by hand.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 403+, for container with self-contained evaporant supply.
- 442, for manually pour-in liquid type tank.

SEE OR SEARCH CLASS:

- 68, Textiles: Fluid Treating Apparatus, subclass 223 for washboards.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for means for heating or cooling the system or fluid.

### 334 With means to adjust current path between electrodes:

This subclass is indented under subclass 333. Subject matter including means to vary the effective length or cross-sectional area of the current flow between the electrodes.

- (1) Note. Generally the varying of the current path results in varying the resistance of the path and consequently the magnitude of the current.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 315, for continuous flow of fluid in fluid-in-circuit type heater.
- 323, for reservoir or tank.
- 329, for line connected boiler.

SEE OR SEARCH CLASS:

- 323, Electricity: Power Supply or Regulation Systems, subclass 296 for voltage or current regulating systems utilizing liquid resistors.
- 338, Electrical Resistors, particularly subclasses 80+ for mechanically variable or adjustable liquid resistors.

- 373, Industrial Electric Heating Furnaces, subclasses 29+ and 120+ for electric furnace structure including adjustable electrodes.
- 335 With supply interlock means:**  
This subclass is indented under subclass 333. Subject matter wherein the tank or container includes means for preventing the flow of water into the container while the electrodes are electrically energized.
- SEE OR SEARCH CLASS:  
200, Electricity: Circuit Makers and Breakers, subclass 50 for interlocking switch arrangements.  
219, Electric Heating, subclass 437 for immersible heating unit.
- 336 Separate electrode compartment:**  
This subclass is indented under subclass 333. Subject matter wherein the tank or container includes a distinct section containing the electrodes to isolate the electrodes from the remainder of the tank or container.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
405, for separate heating chamber.  
445, for immersible heating unit attaching or support means.
- SEE OR SEARCH CLASS:  
4, Baths, Closets, Sinks, and Spittoons, subclasses 524+ and 535+ for means for applying vapor in a bath.  
219, Electric Heating, subclass 437 for immersible heating unit.  
338, Electrical Resistors, particularly subclasses 80+ for mechanically variable or adjustable liquid resistors.
- 337 Electrode compartment removable from tank:**  
This subclass is indented under subclass 336. Subject matter wherein the separate electrode compartment may be separated from the tank.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
406, for removable container with self-contained evaporant supply.
- 338 Electrode details:**  
This subclass is indented under subclass 311. Subject matter including details of the electrode structure of the fluid-in-circuit type heater.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
331, for electrode arrangement for line connected tank.
- SEE OR SEARCH CLASS:  
99, Foods and Beverages: Apparatus, subclass 358 for electrode type and subclass 451 for electric, radiant or vibrational treating means.  
204, Chemistry: Electric and Wave Energy, particularly subclasses 280+ for electrodes for electrolytic cell.  
338, Electrical Resistors, particularly subclasses 80+ for mechanically variable or adjustable liquid resistors.  
373, Industrial Electric Heating Furnaces, subclasses 29+ and 120+ for significant electrode structure combined with furnaces.
- 339 With heat storage means:**  
This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device includes a heat accumulating medium insulated against heat loss for storing heat to be dissipated at a later time by a process of heat transfer.
- (1) Note. See search notes for other heat exchange means and heat absorber without storage of heat to be dissipated at a later time.
- SEE OR SEARCH CLASS:  
38, Textiles: Ironing or Smoothing, subclass 83 for additive heat solid.  
110, Furnaces, subclasses 322+ for baffles or heat retainer structure.  
119, Animal Husbandry, subclass 310 and 320+ for fireless brooder and incubators.  
122, Liquid Heaters and Vaporizers, subclass 33 for accumulator and subclasses 367.1+ for heat transmitter.



- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclass 105 for a hot air furnace having an equalizer, subclass 207 for a body warmer adapted to be heated by a block, subclass 273.5 for a domestic oven having a heat accumulator (e.g., fireless cooker, etc.), subclass 375.1 for an open-top liquid heating vessel that may include a lid having a heat accumulator, subclass 400 for heat accumulator structure, subclasses 617-620 for a solar heat collector having a heat storage mass, or subclass 910 for heat storage using a liquid.
- 132, Toilet, subclass 117 for removable heat storage means.
- 165, Heat Exchange, subclasses 4+, 10, 104.11, 185, and 236 for heat storage.
- 219, Electric Heating, subclass 258 for a heating device combined with a sole plate-type pressure application means (e.g., flatiron, etc.) having a heat storage, exchange, or reflector, subclasses 399+ for an oven having heat energy transfer, distribution, or accumulator means, subclass 430 for a wall-mounted radiant heater having a reflector, subclass 439 for a nonmetallic heat radiating panel having a heating element formed as coating on its surface, subclass 462 for a tank or container having an externally mounted laterally disposed circulation-type heater, subclass 530 for a heater-unit housing, casing, or support means (e.g., frame and single sheet, etc.) including heat storage or transfer means (vanes), or subclass 540 for a heating unit structure including heat storage or transfer means (e.g., fins or plate, etc.).
- 237, Heat Systems, subclass 44 and 75 for heat accumulator.
- 432, Heating, subclass 30 for process of utilizing a heat storage means and subclasses 214+ for heat generating means heats heat storage mass of solid material.

### 340 Method:

This subclass is indented under subclass 339. Subject matter including processes for storing heat in the heat accumulating medium or dissipating stored heat at a later time.

#### SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 236 for process of heat exchange.
- 432, Heating, subclass 30 for process of utilizing a heat storage means.

### 341 For fluid heating (e.g., gas or liquid, etc.):

This subclass is indented under subclass 339. Subject matter wherein the heat storage means is used for heating a liquid or gas.

#### SEE OR SEARCH THIS CLASS, SUBCLASS:

- 379, for concentrated heated air stream.
- 441+, for tank or container type liquid heater.
- 465+, for continuous fluid heater (not in stored medium).

#### SEE OR SEARCH CLASS:

- 34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for apparatus employing heated gas.
- 122, Liquid Heaters and Vaporizers, subclass 35 for liquid heaters and vaporizers having accumulator.
- 126, Stoves and Furnaces, subclass 400 and 617+ for heat storage mass of solar heat collector.
- 134, Cleaning and Liquid Contact With Solids, subclass 105 for devices with heating, cooling or exchange means.
- 137, Fluid Handling, subclass 301 for hydrants with protection against freezing which may be a heater and subclasses 334+ for systems with heating or cooling.
- 138, Pipes and Tubular Conduits, subclasses 32 through 35 for thawing and freeze protection.
- 159, Concentrating Evaporators, appropriate subclasses for heating fluids.
- 165, Heat Exchange, appropriate subclasses for heating fluids.
- 166, Wells, subclasses 57 through 62 for heating or heat insulating means.

- 196, Mineral Oils: Apparatus, subclasses 104+ for vaporizing devices and subclasses 138+ for condensing devices utilizing heating means.
- 202, Distillation: Apparatus, subclasses 81+ for apparatus utilizing heating means.
- 210, Liquid Purification or Separation, subclasses 175+ for systems employing heater or heat exchanger means.

### 342 For vaporization:

This subclass is indented under subclass 339. Subject matter wherein the stored heat is used for converting a substance from a solid or liquid to a gaseous state.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 324+, for fluid-in-circuit type heater.
- 386+, for vaporizer (not in storage medium).

SEE OR SEARCH CLASS:

- 38, Textiles: Ironing or Smoothing, subclass 69 and 77.1 for smoothing implements with moistening means.
- 43, Fishing, Trapping, and Vermin Destroying, subclass 129 for vaporizers in fumigating apparatus.
- 122, Liquid Heaters and Vaporizers, appropriate subclasses for apparatus for generating vapors from liquids and further utilizing the vapors thus generated, e.g., steam generator. The structure found in this class is very similar to those found in Class 219, especially the so-called flashers in subclasses 40+ and wicks in subclass 366.
- 123, Internal-Combustion Engines, subclasses 543+ for charge forming devices involving vaporizers.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 369 through 369.3 for a liquid heating steam chamber for food.
- 128, Surgery, subclasses 203.12+ for vaporizers for medicaments.
- 159, Concentrating Evaporators, appropriate subclasses for devices for the concentration of solids held in solution or suspension by evaporation.

- 196, Mineral Oils: Apparatus, appropriate subclasses for apparatus for the distillation of mineral oils.
- 202, Distillation: Apparatus, appropriate subclasses for distillation apparatus in general.
- 203, Distillation: Processes, Separatory, appropriate subclasses for a process of distilling a liquid.
- 208, Mineral Oils: Processes and Products, Classes 313 and 347+ for a process of distilling mineral oil.
- 219, Electric Heating, subclass 401 for ovens with steam generating means.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 136 for sprayers with means to generate a water vapor or steam.
- 252, Compositions, subclasses 67+ for specific compositions useful for vaporization purposes.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 305 for fume generating apparatus and 292+ for sterilizers using steam.
- 431, Combustion, subclass 208 for a fuel burner having an electrically heated fuel vaporizer.
- 432, Heating, subclass 31 for heating of or by wall or radiant surface.

### 343 For subsequent heating by radiation:

This subclass is indented under subclass 339. Subject matter wherein the stored heat is used for transmitting heat energy to the object or material by electro-magnetic waves within the infrared range of the spectrum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 375+, for convection space heater with radiation.
- 391, for vaporizer using radiant heat source.
- 407+, for radiant heater.
- 483, for continuous flow heater with radiation.

### 344 For subsequent heating by convection:

This subclass is indented under subclass 339. Subject matter wherein the stored heat is used for transmitting heat energy to the object or

material by an air motion as a result of difference in density and the action of gravity.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

347, for convection space heater.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, appropriate subclasses for convection type drying.

126, Stoves and Furnaces, subclasses 67+ for hot air stove structure of the convection type and subclasses 99+ for hot air furnace structure.

165, Heat Exchange, appropriate subclasses for convection heating.

237, Heating Systems, appropriate subclasses for heating systems for rooms or spaces utilizing convective heating of the fluid (air) in the rooms or space.

**345 Means to control heating accumulating medium:**

This subclass is indented under subclass 339. Subject matter wherein the heat storage means includes means responsive to a heat level in accumulating medium to regulate the amount of the heat stored in the accumulating medium.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 492+ for automatic regulating or controlling means.

**346 Heat accumulating medium details:**

This subclass is indented under subclass 339. Subject matter including details of the structure or composition of the heat accumulating medium.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 322+ for baffle or heat retainer structure of furnace.

126, Stoves and Furnaces, subclass 207 for heated block of body, subclass 400 for heat accumulator structure, and subclasses 674+ for absorber of solar heat collector.

**347 Convection space heater:**

This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein air heated by an electric device is intended to heat

an occupied space, e.g., a room by the motion in a fluid resulting from a difference in density and the action of gravity.

SEE OR SEARCH CLASS:

105, Railway Rolling Stock, subclass 451 for convection type heating devices for railway cars.

126, Stoves and Furnaces, subclasses 58+ for hot air stove structure of the convection type; subclasses 99+ for hot air furnace structure; subclasses 148+ for fire plate; subclasses 628+ for solar heat collector.

165, Heat Exchange, appropriate subclasses for convection heating.

219, Electric Heating, subclass 449.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) by convection.

237, Heating Systems, subclasses 46+, 50, and 70+ for heating systems for rooms or spaces utilizing convective heating of the fluid (air) in the rooms or space.

**348 Artificial fire:**

This subclass is indented under subclass 347. Subject matter wherein the convection space heater includes means to give a visual illusion or appearance of an actual fire.

SEE OR SEARCH CLASS:

40, Card, Picture, or Sign Exhibiting, subclass 427 for simulated fireplace.

135, Tent, Canopy, Umbrella, or Cane, subclasses 91+ for portable shelter with heating, lighting or ventilating.

219, Electric Heating, subclass 220 for light means.

431, Combustion, subclass 125 for simulation feature.

**349 Central heating type:**

This subclass is indented under subclass 347. Subject matter wherein the convection space heater is located at a central location to convey heated air to different parts or rooms of a building.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 99+ for hot air furnaces.

- 165, Heat Exchange, subclass 50 for room heat exchangers with central fluid supply.
- 236, Automatic Temperature and Humidity Regulation, subclasses 10+ for hot air furnace.
- 237, Heating Systems, subclasses 50+ for air heating system.
- 454, Ventilation, subclasses 228+ and 330+ for ventilating a building.
- 350 With air delivery duct:**  
This subclass is indented under subclass 349. Subject matter wherein the central heater includes a flue or channel for conveying heated air to different parts or rooms of a building.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 479+, for externally heated line connected section.
- 485+, for heated line section with heating element internal of flow path.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclasses 99+ for hot air furnaces.
- 165, Heat Exchange, subclasses 120+ for impeller or conveyor moving exchange material.
- 351 Floor furnace type:**  
This subclass is indented under subclass 347. Subject matter wherein the convection heater is installed in a recess in the floor of a room.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclass 116 for floor and wall furnaces.
- 352 Baseboard type:**  
This subclass is indented under subclass 347. Subject matter comprising a heating device having one long dimension with means for mounting the device to a wall or floor at their intersection such that its long dimension is parallel to the intersection.
- SEE OR SEARCH CLASS:
- 165, Heat Exchange, subclasses 53+ for related to wall, floor or ceiling structure of a chamber.
- 237, Heating systems, subclass 79 for radiator with shields.
- 454, Ventilating, subclasses 287+ for baseboard type.
- 353 With baffle:**  
This subclass is indented under subclass 352. Subject matter wherein the baseboard heater includes a plate or wall for directing heated air in a desired flow pattern.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 374, for portable convection spaced heater.
- 383, for portable heated air stream.
- 354 With intermediate heat absorber:**  
This subclass is indented under subclass 347. Subject matter wherein the convection space heater includes an accumulator placed between the heater and the space for collecting heat from the heater for subsequent transmission to the air being heated.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 302, for heat exchange fluid in borehole type heater.
- 339+, for heat storage means.
- 377+, for heat exchange fluid in convection space heater.
- 456, for heat exchange fluid in tank or container type liquid heater.
- 496, for heat exchange fluid in continuous flow fluid heater.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclass 101 for hot air furnace with boiler.
- 165, Heat Exchange, subclasses 104.11+ for intermediate heating by convection.
- 236, Automatic Temperature and Humidity Regulation, subclass 22 and 36+ for radiator type.
- 237, Heating Systems, subclasses 16 through 18 and 70+ for radiator and boiler.
- 252, Compositions, subclass 67 for vaporization, or expansion, refrigeration or heat or energy exchange.
- 355 Heated by radiant source:**  
This subclass is indented under subclass 354. Subject matter wherein the heat absorber is heated by energy in the form of electromag-

netic waves within the infrared range of the spectrum.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 391, for vaporizer using radiant heat source.
- 407+, for radiant heater.
- 460, for liquid heater producing radiation.
- 483, for fluid heater producing radiation.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclasses 638+ for thermosiphonic circulation.

### **356 With fan blower:**

This subclass is indented under subclass 355. Subject matter wherein the air to be heated is directed to the heat absorber by a rotating fan.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 358, for guiding heated air by heat exchange fluid.
- 360+, for forced air type.

### **357 With fluid heat absorber:**

This subclass is indented under subclass 354. Subject matter wherein the intermediate heat absorber includes a liquid or gas for absorbing the heat.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 302, for heat exchange fluid used in a bore-hole.
- 339, for convection space heating in heat storage.
- 377, for convection combined with radiation.
- 456, for heat exchange fluid line connecting heated storage tank.
- 496, for continuous fluid heater.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclass 101 for hot-air furnace combined with boiler.
- 165, Heat Exchange, subclass 104.11 for intermediate fluent heat exchange material receiving and discharging heat.
- 237, Heating Systems, subclasses 16 through 18 and 70+ for radiator and boiler.

### **358 By fan blower:**

This subclass is indented under subclass 357. Subject matter wherein the air to be heated is directed to the heat absorber by a rotating fan.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 356, for guiding heated air by radiant source.
- 360+, for forced air type.

### **359 Wall mounted:**

This subclass is indented under subclass 357. Subject matter wherein the heating device is mounted on a continuous side structure of a room.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 352+, for baseboard type heater.
- 363, for forced air type.
- 370, for convection space heater without forced air.
- 381, for concentrated heated air stream.
- 430, for radiant heater with reflector.
- 436, for radiant extended surface heater.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclass 116 for floor or wall furnace.
- 165, Heat Exchange, subclasses 53+ for related wall structure of a chamber.

### **360 Forced air type:**

This subclass is indented under subclass 347. Subject matter wherein the means for guiding air to be heated employs a power driven fan, blower, or pump to force the air into contact with the heating element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 379+, for concentrated heated air stream.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclass 103 and 110 for hot air furnace with compressed air.
- 137, Fluid Handling, subclass 340 for systems including apparatus in which the fluid in system circulates in heat exchange relationship.

- 165, Heat Exchange, subclasses 120+ for impeller or conveyor moving exchange material.
- 219, Electric Heating, subclass 400 for heat energy transfer by convection.
- 236, Automatic Temperature and Humidity Regulation, subclasses 10+ for hot air furnaces.
- 237, Heating Systems, subclasses 50+ for hot air heating systems.
- 415, Rotary Kinetic Fluid Motors or Pumps, appropriate subclasses for fluid pump.
- 416, Fluid Reaction Surfaces (i.e., Impeller), appropriate subclasses for impeller.
- 417, Pumps, appropriate subclasses for pumps.
- 361 Heating attachment for fan:**  
This subclass is indented under subclass 360. Subject matter wherein the forced air heater includes a heating unit, having an electrical resistance element, attachable to a self-supported fan for heating air circulated by the fan.
- 362 Fan with heated blades:**  
This subclass is indented under subclass 360. Subject matter wherein the heating elements for heating the air are mounted on or disposed in the vanes of the fan.
- SEE OR SEARCH CLASS:
- 415, Rotary Kinetic Fluid Motors or Pumps, subclass 114, 116, and 175-179 for passage in blade, vane, shaft or rotary distributor communication with working fluids.
- 416, Fluid Reaction Surfaces (i.e., Impellers), subclass 95 for heating, cooling or thermal insulation means.
- 363 Wall mounted:**  
This subclass is indented under subclass 360. Subject matter wherein the forced air heater is readily mounted on a continuous side structure of a room.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 359, for convection heater with heat exchange fluid.
- 370, for convection space heater.
- 381, for concentrated heated air stream.
- 430, for radiant heater with reflector.
- 436+, for radiant extended surface heater.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclass 116 for floor or wall furnace.
- 165, Heat Exchange, subclasses 53+ for related wall structure of a chamber.
- 364 Ceiling mounted:**  
This subclass is indented under subclass 360. Subject matter wherein the forced air heater is readily mounted to the overhead covering of a room.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 436, for heat radiating panel.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclass 116 for floor or wall furnace.
- 165, Heat Exchange, subclasses 53+ for related wall structure of a chamber.
- 454, Ventilation, subclasses 292+ for ceiling type diffuser and subclass 354 for ceiling or wall mounted.
- 365 Portable:**  
This subclass is indented under subclass 360. Subject matter wherein the forced air heater may be lifted or carried bodily from place to place by hand.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 373, for portable convection space heater.
- 383, for portable heated air stream.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclasses 67+ and 110 for hot air stoves and furnaces.
- 219, Electric Heating, subclass 533 for portable heater unit with housing, casing or support means.
- 366 With fan position adjusting means:**  
This subclass is indented under subclass 365. Subject matter wherein the portable forced air type heater includes means for selectively varying the position of the fan with respect to a base or support structure.

**367 Multi-direction air outlet:**

This subclass is indented under subclass 365. Subject matter wherein the portable heater includes a passage or vent for distributing heated air in two or more different directions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

440, for radiant heater.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclasses 126+ for plural outlets.

**368 With baffle:**

This subclass is indented under subclass 365. Subject matter wherein the portable heater includes a plate or wall for directing heated air in a desired air flow pattern.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

353, for portable baseboard type convection space heater.

374, for portable convection space heater.

388, for portable heated air stream.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 67+ for hot air and subclass 99 for hot air furnace with air baffles.

165, Heat Exchange, subclasses 120+ for conveyor moving exchange material.

**369 Counterflow:**

This subclass is indented under subclass 368. Subject matter wherein the baffle causes an air-flow through the housing to reverse its direction of flow at least once when inflowing from an inlet to an outlet.

**370 Wall mounted:**

This subclass is indented under subclass 347. Subject matter wherein the convection space heater is readily mounted on a continuous side structure of a room.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

359, for convection heater with heat exchange fluid.

363, for forced air type heater.

381, for concentrated heated air stream.

430, for radiant heater with reflector.

436+, for radiant extended surface heater.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclass 116 for floor or wall furnace.

165, Heat Exchange, subclasses 53+ for related wall structure of a chamber.

454, Ventilation, subclasses 276+ for wall type diffuser and subclass 354 for ceiling or wall mounted.

**371 In wall cavity:**

This subclass is indented under subclass 370. Subject matter wherein the convection space heating device is located within a recess or hollow space formed in the wall of a room.

**372 Mounted in or on window or door:**

This subclass is indented under subclass 347. Subject matter wherein the convection heater is mounted in or on an opening in the wall of a building for the admission of light and air, or an opening in a wall to permit entrance into or exit from a room, building or other enclosure.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 53+ for related wall structure.

219, Electric Heating, subclass 203 for windshield or window of a vehicle and subclass 213 for static structure.

454, Ventilation, for subclass 195 for door and subclasses 196+ for window.

**373 Portable:**

This subclass is indented under subclass 347. Subject matter wherein the convection space heater may be lifted or carried bodily from place-to-place by hand.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

365, for portable forced air type heater.

383, for portable heated air stream.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 67+ and 110 for hot air stoves and furnaces.

219, Electric Heating, subclass 533 for portable heater unit with housing, casing or support means.

**374 With baffle:**

This subclass is indented under subclass 373. Subject matter wherein the portable heater includes a plate or wall for directing heated air in a desired air flow pattern.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 353, for baseboard type convection space heater.
- 368, for portable convection space heater.
- 383, for portable heated air stream.

**375 Combined with radiation:**

This subclass is indented under subclass 347. Subject matter wherein the heated air in a room is resulted in combination with electromagnetic waves within the infrared range of the spectrum.

- (1) Note. An example of the apparatus to be found here comprises a device transmitting heat energy by convection and direct radiation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 343, for using stored heat for radiation.
- 344+, for using stored heat for convection.
- 407+, for radiant heater.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclasses 91+ for electric radiant.
- 165, Heat Exchange, subclass 49 for radiant panel; subclass 133 for polished surface; subclasses 148+ for radiator core type; subclasses 168+ for panel or wall structure; and subclass 185 for heat transmitter.
- 236, Automatic Temperature and Humidity Regulation, subclasses 36+ for heating radiator.
- 237, Heating Systems, subclasses 16+ and 70+ for heat radiator.

**376 With reflector:**

This subclass is indented under subclass 375. Subject matter including opaque mirror-like means which redirects incident infrared radiation back into the medium from which it came.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 422+, for radiant heater.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 133 for coated, roughened or polished surface.
- 359, Optics: Systems (Including Communication) and Elements, subclasses 636+ for mirror.

**377 With heat exchange fluid:**

This subclass is indented under subclass 375. Subject matter including a fluid which is heated by the resistance heating element for subsequent transmission to the space to be heated.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 344, for convection space heating in heat storage.
- 357, for intermediate heat absorber.
- 456, for heat exchange fluid line connected heated storage tank.
- 496, for continuous fluid heater.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 104.11+ for intermediate fluent heat exchange.
- 236, Automatic Temperature and Humidity Regulation, subclasses 36+ for heating radiators.
- 237, Heating Systems, subclasses 16+ for combined radiator and boiler and subclasses 70+ for heat radiators.
- 252, Compositions, subclass 67 for vaporization, or expansion, refrigeration or heat or energy exchange.

**378 In plural sections:**

This subclass is indented under subclass 377. Subject matter having two or more compartments for accommodating the heat exchange fluid.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 172+ for side-by-side tubular structure or tube sections.



237, Heating Systems, subclasses 16+ for combined radiator and boiler and subclasses 70+ for heat radiator.

**379 Concentrated heated air stream (i.e., blast):**  
This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device includes means for blowing air through a passage in which an electrical resistance heating element is mounted for producing an intensified or a jet-like flow of heated air.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

360, for forced air type.  
473, for fluid heater carried on discharge member.  
478, for fluid conveying tube or pipe comprising resistance heating element.  
479, for externally heated line connected section.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, subclasses 535+ for means for applying hot air directly to body of user.  
5, Beds, subclass 423 for means to force air.  
34, Drying and Gas or Vapor Contact With Solids, subclasses 94+ for hair on head and subclasses 241+ for gas or vapor distributing and applying agitators.  
132, Toilets, subclasses 112+ for orifice for applying fluent material and subclasses for heater, fluid supply, or surrounding fluid housing.  
156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 497 for gas, vapor or flame contact means for work.  
165, Heat Exchange, subclasses 120+ for impeller or conveyor moving exchange material.

**380 For drying body part:**  
This subclass is indented under subclass 379. Subject matter wherein the concentrated heated air stream device is disclosed for drying a part of human body.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

360, for forced air type.

**381 Wall mounted:**  
This subclass is indented under subclass 380. Subject matter wherein the body drying heater is readily mounted on a continuous side structure of a room.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

359, for convection heater with heat exchange fluid.  
363, for forced air type heater.  
370, for convection space heater.  
430, for radiant heater with reflector.  
436, for radiant extended surface heater.

**382 With support:**  
This subclass is indented under subclass 379. Subject matter wherein the concentrated heated air stream heater includes means to position an article to be heated in the path of the heated air stream.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 451.1+ for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) having support for a heating unit.

**383 Portable:**  
This subclass is indented under subclass 379. Subject matter wherein the concentrated heated air stream heater may be lifted or carried bodily from place-to-place by hand.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

373, for portable convection space heater.  
365, for portable forced air type heater.

SEE OR SEARCH CLASS:

219, Electric Heating, subclass 227 for electrically hand manipulative tools or instruments and subclass 533 for portable heater unit with housing, casing or support means.

- 384 With handle:**  
 This subclass is indented under subclass 383. Subject matter wherein the heating device includes means attached to the heating device to be gripped by the hand when the device is lifted or carried.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 404, for hand-held container.  
 476, for hand-held discharge member.
- 385 Pistol-grip type:**  
 This subclass is indented under subclass 384. Subject matter wherein the handle is L-shaped and attached to the heating device at only one end.
- SEE OR SEARCH CLASS:  
 16, Miscellaneous Hardware, subclasses 400+ for handle.
- 386 Vaporizer:**  
 This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device is disclosed for use in converting a substance from a solid or liquid to a gaseous state.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 324+, for fluid-in-circuit type heater.  
 342, for vaporization with heat storage means.
- SEE OR SEARCH CLASS:  
 38, Textiles: Ironing or Smoothing, subclasses 77.1+ for moistening means.  
 43, Fishing, Trapping, and Vermin Destroying, subclasses 125+ for vaporizers in fumigating apparatus.  
 62, Refrigeration, subclasses 50.1+ for liquified gas transferred as liquid.  
 68, Textiles: Fluid Treating Apparatus, subclass 222 for steamers.  
 118, Coating Apparatus, subclasses 726+ for crucible.  
 122, Liquid Heaters and Vaporizers, appropriate subclasses for apparatus for generating vapors from liquids and further utilizing the vapors thus generated, e.g., steam generator. The structure found in this class is very similar to those found in Class 219, especially the so-called flashers in subclasses 40+ and wicks in subclass 366 which do not disclose an electrical heating means.
- 123, Internal-Combustion Engines, subclasses 543+ for charge forming devices involving vaporizers.
- 128, Surgery, subclasses 203.12+ for vaporizers for medicaments.
- 132, Toilet, subclasses 227+ for heater, fluid supply, or surrounding fluid housing and subclasses 272+ for vapor reservoir.
- 159, Concentrating Evaporators, appropriate subclasses for devices for the concentration of solids held in solution or suspension by evaporation.
- 196, Mineral Oils: Apparatus, subclasses 104+ for apparatus, for the distillation of mineral oils and, especially, subclass 121 for electric heating.
- 202, Distillation: Apparatus, appropriate subclasses for distillation apparatus in general.
- 203, Distillation: Processes, Separatory, appropriate subclasses for a process of distilling a liquid.
- 208, Mineral Oils: Processes and Products, subclass 313 and 347+ for a process of distilling mineral oil.
- 210, Liquid Purification or Separation, subclasses 175+ for heater or heat exchange.
- 219, Electric Heating, subclass 401 for ovens with steam generating means.
- 223, Apparel Apparatus, subclass 51 for heating and steaming.
- 236, Automatic Temperature and Humidity Regulation, subclass 44 for humidity control.
- 237, Heating Systems, subclass 9 for steam and subclasses 16+ for combined radiator and boiler.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 34+ for diffusers; subclasses 128+ for sprayers with means to generate a water vapor or steam; and subclasses 136+ for vapor generator.
- 252, Compositions, subclasses 67+ for specific compositions useful for vaporization purposes.

- 261, Gas and Liquid Contact Apparatus, subclasses 127+ for external supply or removal of heat and subclass 141 for electric heater.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 305 for fume generating apparatus and 292+ for sterilizers using steam.
- 431, Combustion, subclasses 13+, 208, and 258 for a fuel burner having an electrically heated fuel vaporizer.
- 516, Colloid Systems and Wetting Agents; Subcombinations Thereof; Processes of Making, Stabilizing, Breaking, or Inhibiting, subclasses 1+ for continuous gas or vapor phase colloid system (e.g., smoke, fog, aerosol, cloud, mist) or agents for such systems or making or stabilizing such systems or agents, when generically claimed or when there is no hierarchically superior provision in the USPC for the specifically claimed art.
- 607, Surgery: Light, Thermal, and Electrical Application, subclasses 81+ for bathing apparatus and subclasses 96+ for thermal applicators.
- 387 Method:**  
This subclass is indented under subclass 386. Subject matter including processes for converting a substance from a solid or liquid to a gaseous state.
- SEE OR SEARCH CLASS:  
134, Cleaning and Liquid Contact With Solids, subclasses 12+ for process by distilling, or liquefying vapors of, used agent.  
165, Heat Exchange, subclasses 200+ for heat exchange process.  
208, Mineral Oils: Processes and Products, subclasses 308+ for fractionation.  
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 1+ for processes of distributing fluid material on or over an area or into the air.  
431, Combustion, subclass 13 for processes of heating or heater operation.  
432, Heating, subclass 13 for process of heating or heater operation.
- 388 For metal vapor deposition:**  
This subclass is indented under subclass 386. Subject matter wherein the heating device is disclosed for vaporizing a metallic substance to be deposited on a substrate.
- (1) Note. The terms "evaporant", "coating material" and "film-forming material" are synonymous in this art.
- SEE OR SEARCH CLASS:  
118, Coating Apparatus, subclasses 715+ for gas or deposition.
- 389 With crucible:**  
This subclass is indented under subclass 388. Subject matter wherein the vaporizer includes an evaporation vessel for containing the metallic substance to be evaporated.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
403, for container with self-contained evaporant supply.
- SEE OR SEARCH CLASS:  
118, Coating Apparatus, subclasses 726+ for crucible or evaporator structure.  
432, Heating, subclasses 262+ for crucible.
- 390 With disposable evaporant cartridge or container:**  
This subclass is indented under subclass 386. Subject matter wherein the vaporizer includes a replaceable case or shell or vessel for containing the substance to be evaporated.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
403+, for container with self-contained evaporant supply.  
470, for continuous fluid heater.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclass 46 for flexible envelope or cover type.  
219, Electric Heating, subclass 214 for vending, dispensing or display device.  
222, Dispensing, subclasses 146.1+ for heating or cooling means.  
604, Surgery, subclasses 113+ for cooling or heating body, treating or collected material or device.

**391 By radiant heat source:**

This subclass is indented under subclass 386. Subject matter wherein the substance is converted into gaseous form by heat energy in the form of electromagnetic waves within the infrared range of the spectrum.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 347, for convection space heating.
- 407+, for radiant heater.
- 460, for liquid heater producing radiation.
- 483, for fluid heater producing radiation.

**SEE OR SEARCH CLASS:**

- 159, Concentrating Evaporators, Digest 6 for infrared.
- 250, Radiant Energy, subclasses 493.1+ for infrared radiation generators not provided for elsewhere.
- 431, Combustion, subclass 31 for scavenging or purging period started by combustion demand.

**392 Wall mounted:**

This subclass is indented under subclass 386. Subject matter wherein the vaporizer may be mounted on a continuous side structure of a room.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 359, for convection heater with heat exchange.
- 363, for forced air type heater.
- 370, for convection space heater.
- 381, for concentrated heated air stream heater.
- 430, for radiant heater with reflector.
- 436, for radiant extended surface heater fluid.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclasses 53+ for related wall, floor or ceiling structure of a chamber.

**393 By light bulb heat source:**

This subclass is indented under subclass 386. Subject matter wherein the substance is converted to the vapor state by the heat generated from an incandescent filament enclosed in a sealed, transparent envelope.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclass 220 for light means and subclass 552 for heating element structure.
- 313, Electric Lamp and Discharge Devices, appropriate subclasses for electric lamp.
- 338, Electrical Resistors, subclasses 234+ for gaseous or vacuum spacing between element and casing or housing.
- 362, Illumination, subclass 101 for liquid container.

**394 Liquid evaporant (e.g., water, etc.):**

This subclass is indented under subclass 386. Subject matter wherein the substance to be evaporated is a liquid (e.g., water, etc.).

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 324+, for steam or vapor generator.

**SEE OR SEARCH CLASS:**

- 4, Baths, Closets, Sinks, and Spittoons, subclasses 524+ for vapor or heat in bath and subclasses 535+ for means for applying vapor or hot air directly to body of user.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 20 through 20.2 for a cooking stove having an oven heated by steam or hot water, subclass 113 for a hot air furnace having an air moistening means, subclass 350.2 for a fluid fuel burner other than a top-accessible liquid heating vessel vaporizer or humidifier or subclasses 369-369.3 for a liquid heating steam chamber for food.
- 237, Heating Systems, subclass 78 for air moistener.

**395 With wick:**

This subclass is indented under subclass 394. Subject matter wherein the liquid to be evaporated is transferred from a reservoir to the heating element by a porous or absorbent pad or fibrous matter woven into a bundle.

## SEE OR SEARCH CLASS:

- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 34+ for slow diffusers and, particularly, subclasses 44+ for wicks.
- 261, Gas and Liquid Contact Apparatus, subclasses 94+ for porous mass and subclasses 100+ for porous sheets.
- 432, Heating, subclasses 120+ for work chamber having heating means.

**396 In continuous flow line connected heater:**

This subclass is indented under subclass 394. Subject matter wherein the liquid evaporant is contained in means defining a flow path for uninterrupted flow of the liquid from an inlet connected to a pressurized source to a vapor outlet.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 465, for continuous flow type fluid heater.

## SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, appropriate subclasses for liquid heaters of the continuous flow type.
- 123, Internal-Combustion Engines, subclasses 543+ for continuous flow heater associated with internal-combustion engine.
- 128, Surgery, subclass 203.17 for electrically heated means for producing water vapor.
- 196, Mineral Oils: Apparatus, subclasses 104+ vaporization.
- 219, Electric Heating, subclasses 600+ for inductive heating, subclasses 678+ for microwave heating, and subclasses 764+ for capacitive dielectric heating.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for the system fluid with heating or cooling, and, particularly, subclasses 136+ for vapor generation.
- 431, Combustion, subclass 208 for electrically heated section.

**397 Pipe or tube forms flow path:**

This subclass is indented under subclass 396. Subject matter wherein the flow path for the liquid to be evaporated is a liquid-conveying long passage or tube.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 320, for pipe or tube section forming flow passage with fluid-in-circuit.
- 478, for fluid conveying tube or pipe.
- 480+, for pipe or tube forming flow path in continuous fluid heater.
- 488+, for pipe or tube forming flow path in with heating elements internal of flow path.

**398 With internal heating element:**

This subclass is indented under subclass 397. Subject matter wherein an electrical resistance heating element is located within the pipe or tube.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 320, for tube or pipe forming flow path.
- 485+, for heated line section with heating element internal of flow path.

**399 Flash chamber:**

This subclass is indented under subclass 394. Subject matter wherein the heating device includes an enclosed compartment in which the evaporant is instantly vaporized upon injection therein.

## SEE OR SEARCH CLASS:

- 38, Textiles: Ironing or Smoothing, subclass 77.83 for additional chamber for generating steam.
- 122, Liquid Heaters and Vaporizers, subclass 40 for flasher.
- 159, Concentrating Evaporators, subclass 3 for spray type evaporators.
- 203, Distillation: Processes, Separatory, subclass 84 for spraying of distilland into vaporization zone and subclass 90 for returning distillation product to a previous distillation zone.
- 208, Mineral Oils: Processes and Products, subclass 361 for flash vaporization.
- 219, Electric Heating, subclasses 222+ for hair heaters.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for heating or cooling means for the system or system fluid.

- 400 In-line connected closed tank (i.e., pressurized):**  
 This subclass is indented under subclass 394. Subject matter wherein the liquid is contained in a vessel connected to a source of liquid supply, and from which the vapor may be drawn off from an outlet or draw off pipe, and in which pressures above atmosphere may be maintained.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 325+, for line connected boiler.  
 449+, for fluid heating container or tank.
- SEE OR SEARCH CLASS:  
 159, Concentrating Evaporators, subclass 22 for closed evaporating chambers.
- 401 With internal heating element:**  
 This subclass is indented under subclass 441. Subject matter wherein the closed tank includes an electrical resistance heating element which is supported within the vessel.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 451, for line connected tank.  
 497, for details of immersion heater.
- 402 In-line connected open tank or container (i.e., nonpressurized):**  
 This subclass is indented under subclass 394. Subject matter wherein the liquid is contained in a vessel connected to a source of liquid supply, and from which the vapor may be drawn off from an outlet or draw off pipe, and in which pressures equal to atmosphere may be maintained.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 325+, for line connected boiler.
- SEE OR SEARCH CLASS:  
 126, Stoves and Furnaces, subclass 113 for air moisteners.  
 159, Concentrating Evaporators subclasses 32+ for open pans.  
 236, Automatic Temperature and Humidity Regulation, subclass 44 for humidity control.
- 237, Heating Systems, subclass 78 for air moistener.
- 261, Gas and Liquid Contact Apparatus, subclasses 127+ for external supply or removal of heat; subclasses 141+ for heat producer; digest 15 for duct humidifier.
- 403 Container with self-contained evaporant supply:**  
 This subclass is indented under subclass 394. Subject matter wherein the liquid evaporant is bodily contained within the vaporizing device.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 333+, for manually filled tank or container.  
 444+, for portable tank or container.
- SEE OR SEARCH CLASS:  
 237, Heating Systems, subclass 78 for air moisteners.
- 404 Hand-held:**  
 This subclass is indented under subclass 403. Subject matter wherein the container is to be held in the hand during use.
- SEE OR SEARCH CLASS:  
 38, Textiles: Ironing or Smoothing, subclass 77.1 for moistening means.  
 43, Fishing, Trapping, and Vermin Destroying, subclasses 125+ for fumigators.  
 68, Textiles: Fluid Treating Apparatus, subclass 222 for steamers.  
 607, Surgery: Light, Thermal, and Electrical Application, subclass 96 for thermal applicators.
- 405 With separate heating chamber:**  
 This subclass is indented under subclass 403. Subject matter wherein the container is subdivided into two communicating chambers, the heating device being disposed in one chamber and the evaporant in the other chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 336+, for separate electrode compartment.

**406 Removable:**

This subclass is indented under subclass 405. Subject matter wherein the heating chamber may be readily attached to or detached from the container.

SEE OR SEARCH THIS CLASS, SUBCLASS:

337, for electrode compartment removable from tank.

**407 Radiant heater:**

This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device includes means which emits heat in the form of electromagnetic waves within the infrared range of the spectrum.

SEE OR SEARCH THIS CLASS, SUBCLASS:

343, for using stored heat for radiation.

375+, for convection space heater with radiation.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclasses 524+ for apparatus which may utilize radiant heat.

118, Coating Apparatus, subclasses 620+ for means to apply electrical or radiant energy to work.

119, Animal Husbandry, subclasses 301+ for brooders combined with incubators, and subclasses 318+ for electrical incubators utilizing radiant heating.

126, Stoves and Furnaces, subclasses 91+ for radiation type and 569+ for solar heat collector.

165, Heat Exchange, subclass 49 for radiant building panels and subclass 133 for coated, roughened or polished surface.

236, Automatic Temperature and Humidity Regulation, subclasses 36+ for systems utilizing heating radiators.

237, Heating Systems, subclasses 16+ for combined heat radiator and boiler and subclasses 70+ for heat radiators in general.

250, Radiant Energy, subclasses 493.1+ for infrared radiation generators not provided for elsewhere.

313, Electric Lamp and Discharge Devices, appropriate subclasses for radiant type.

427, Coating Processes, subclass 521 for coating processes utilizing radiation as a heat source to polymerize an applied coating, subclass 545, for coating processes utilizing resistance heat in the pretreatment of a substrate or the post-treatment of a coated substrate; subclasses 592+ for coating processes employing resistance heat during the deposition of a coating on a substrate.

607, Surgery: Light, Thermal, and Electrical Application, subclass 96 for thermal applicators which may utilize radiant energy.

**408 With filter or diffuser for radiant energy:**

This subclass is indented under subclass 407. Subject matter wherein the radiant heater includes means for attenuating certain wavelengths while passing others with relatively no change, or means for scattering or dispersing radiation within selected wavelengths.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 110+ for optical or special ray transmissive envelope.

362, Illumination, subclass 293 for selected wavelength modifier.

**409 Hand-held:**

This subclass is indented under subclass 407. Subject matter wherein the radiant heater is to be held in the hand during use.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 504 for hand-held.

607, Surgery: Light, Thermal, and Electrical Application, subclasses 88+ for light applicators.

**410 With air or gas circulation:**

This subclass is indented under subclass 409. Subject matter wherein the hand held radiant heater comprises means to provide a flow of air or gas.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 383, for portable air blaster.  
 476, for hand-held discharge member.
- 411 Lamp banks (i.e., array of plural lamps):**  
 This subclass is indented under subclass 407. Subject matter wherein the radiant heater comprises a plurality of incandescent filaments each enclosed in a sealed, transparent envelope arranged in a line or in tiers.
- SEE OR SEARCH CLASS:  
 219, Electric Heating, subclass 405 for heat energy reflecting or directing means, and subclass 411 for infrared generating means.  
 362, Illumination, subclasses 227+ for plural light sources.
- 412 Adjustable lamps position:**  
 This subclass is indented under subclass 411. Subject matter wherein the array of plural lamps includes means to allow at least a group of lamps to shift from one position to another with respect to a base or support structure.
- SEE OR SEARCH CLASS:  
 362, Illumination, subclass 239 for relative adjustment means.
- 413 Adjustable individual lamp position:**  
 This subclass is indented under subclass 412. Subject matter wherein the group of lamps includes means to allow each lamp to shift with respect to base or support structure.
- 414 Lamp banks form arch:**  
 This subclass is indented under subclass 411. Subject matter wherein the lamp banks are arranged to form a curve or bow.
- 415 Lamp banks movable relative to stationary work during use:**  
 This subclass is indented under subclass 411. Subject matter wherein the lamp banks includes means permitting the lamp banks to be moved along a fixed track during use.
- 416 With chamber:**  
 This subclass is indented under subclass 407. Subject matter wherein the heating device is located in an enclosed cavity.
- SEE OR SEARCH CLASS:  
 219, Electric Heating, subclass 405 for heat energy reflecting or directing means and subclass 411 for infrared generating means.
- 417 For heating moving strand, web, or sheet:**  
 This subclass is indented under subclass 407. Subject matter wherein the radiant heater includes means for heating a strand, web or sheet like material during its transport.
- SEE OR SEARCH CLASS:  
 34, Drying and Gas or Vapor Contact With Solids, subclass 519 and 611+ for sheets, webs or strands.  
 219, Electric Heating, subclass 388 for conveyor.
- 418 With support for workpiece:**  
 This subclass is indented under subclass 407. Subject matter wherein the radiant heater includes structural means to position a work-piece with respect to a base or structure.
- SEE OR SEARCH CLASS:  
 219, Electric Heating, subclass 405 for an oven having a heating unit casing or support including energy reflecting or directing means, subclass 411 for an oven having infrared generating heating unit structure, or subclasses 460.1+ for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating element is gapped from an underside of the support surface (e.g., ceramic plate, radiation type, etc.).  
 362, Illumination, subclass 33 for work-table lighting system.
- 419 Focused radiant beam:**  
 This subclass is indented under subclass 407. Subject matter wherein the radiant heater includes means for producing intense electromagnetic radiation in a converging pattern to a limited or well-defined area of an object, e.g., point or line, etc.
- SEE OR SEARCH CLASS:  
 126, Stoves and Furnaces, subclass 683 and 684+ for concentrating reflector; subclasses 683 and 698+ for concen-



- trating lens; and subclasses 680+ for energy concentrator with support for material heated.
- 607, Surgery: Light, Thermal, and Electrical Application, subclasses 88+ for transparent rods.
- 420 Plural reflectors:**  
This subclass is indented under subclass 419. Subject matter including two or more opaque mirror-like means which redirect the incident radiation back to the medium from which it came.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclass 405 for heat energy reflecting or directing means and subclass 411 for infrared generating means.
- 359, Optics: Systems (Including Communication) and Elements, subclasses 850+ for plural mirrors.
- 362, Illumination, subclasses 297+ for plural reflecting surface and subclasses 346+ for plural separate reflectors or separate section.
- 421 Elliptical or ellipsoidal reflector:**  
This subclass is indented under subclass 419. Subject matter wherein the concentrated beam is produced by a reflector assembly of elliptical or ellipsoidal shape.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclass 405 for heat energy reflecting or directing means and subclass 411 for infrared generating means.
- 359, Optics: Systems (Including Communication) and Elements, subclasses 838+ for mirrors.
- 422 With reflector:**  
This subclass is indented under subclass 407. Subject matter including opaque mirror-like means which redirects the electromagnetic radiation from a source into a flow of electromagnetic radiation in a parallel or diffuse pattern.
- SEE OR SEARCH CLASS:
- 165, Heat Exchange, subclass 133 for coated, roughened or polished surface.
- 219, Electric Heating, subclass 405 for an oven having a heating unit casing or support including energy reflecting or directing means, subclass 411 for an oven having infrared generating heating unit structure, or subclass 455.12 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) having a particular supporting, retaining, or mounting for a heating unit including a reflector.
- 250, Radiant Energy, subclasses 493.1+ for an invisible radiation source with a casing or a radiation modifying member.
- 338, Electrical Resistors, subclass 11 for a resistive element combined with means for reflecting heat onto the element.
- 343, Communications: Radio Wave Antennas, subclasses 700+ for radio antennas and, particularly, subclasses 912+ for reflectors or directors.
- 359, Optics: Systems (Including Communication) and Elements, for light reflecting or directing means in general and, especially, subclasses 838+ for optic mirrors or reflectors.
- 362, Illumination, for artificial light directing or reflecting means and, particularly, subclasses 296+ and 341+ for reflectors.
- 423 Elongated reflector:**  
This subclass is indented under subclass 422. Subject matter wherein the reflector has a length greater than its width.
- 424 Heating element in transparent tubular envelope:**  
This subclass is indented under subclass 423. Subject matter wherein the heating device includes a tube shape enclosure enclosing the heating element and is translucent to the radiation.
- SEE OR SEARCH CLASS:
- 313, Electric Lamp and Discharge Devices, appropriate subclasses for transparent tubular envelope.
- 338, Electrical Resistors, subclasses 234+ for gaseous or vacuum spacing between element and casing or housing.

- 425 With exposed radiant heating element:**  
This subclass is indented under subclass 423. Subject matter in which the heating element lays open to the atmosphere.
- 426 Bowl-shaped reflector:**  
This subclass is indented under subclass 422. Subject matter wherein the reflector's shape is defined by a concave surface having a central axis of rotation (e.g., hemispherical or parabolic reflector).
- SEE OR SEARCH CLASS:  
219, Electric Heating, subclass 405 for heat energy reflecting or directing means and subclass 411 for infrared generating means.
- 427 Annular heating element concentric with reflector axis:**  
This subclass is indented under subclass 426. Subject matter wherein the heating element is ring shaped and centered about the central axis of the bowl-shaped reflector.
- 428 Linear heating element aligned with reflector axis:**  
This subclass is indented under subclass 426. Subject matter wherein the heating element is extended in a line and aligned with the central axis of the bowl-shaped reflector.
- 429 Coiled on core:**  
This subclass is indented under subclass 428. Subject matter wherein the electric resistance wire is wound on an elongated electrically insulated support member.
- SEE OR SEARCH CLASS:  
338, Electrical Resistors, subclasses 296+ for helical or wound resistance element.
- 430 Wall mounted:**  
This subclass is indented under subclass 422. Subject matter wherein the radiant heater with reflector is readily mounted on a continuous side structure of a room or other enclosure.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
359, for convection heater with heat exchange fluid.
- 363, for forced air type heater.  
370, for convection space heater.  
381, for concentrated heated air stream heater.  
392, for vaporizer.  
436, for radiant extended surface heater.
- 431 Collapsible or foldable reflector:**  
This subclass is indented under subclass 422. Subject matter wherein the reflector comprises a plurality of reflector sections which may be brought into a compact form by bending and laying the sections together.
- 432 Radiant extended surface type heater:**  
This subclass is indented under subclass 407. Subject matter wherein the radiant heater comprises a wide or enlarged surface for emitting radiation as a broad beam.
- SEE OR SEARCH CLASS:  
165, Heat Exchange, subclass 49 for radiant building panel; subclasses 168+ for conduit within, or conforming to, panel or wall structure; and subclasses 172+ for side-by-side tubular structure or tube sections.  
219, Electric Heating, subclass 213 for static structure.  
338, Electrical Resistors, subclasses 283+ for zigzag or sinuous resistance element; subclasses 306+ for base extending along resistance element; subclasses 315+ for mounting or supporting means; and subclass 321 for resistance element cores and frames.  
373, Industrial Electric Heating Furnaces, subclasses 127 through 134 for having resistance encasement means.  
432, Heating, subclass 31 for heating of or by wall or radiant surface.
- 433 With exposed radiant heating element:**  
This subclass is indented under subclass 432. Subject matter wherein the heating element lays open to the atmosphere.
- 434 On ceramic support structure:**  
This subclass is indented under subclass 433. Subject matter wherein the radiant heating element is supported by an electrically insulative refractory material.

**435 With heat radiating panel:**

This subclass is indented under subclass 432. Subject matter wherein the radiant heater comprises an overall rectangular perimeter having length and width greatly exceeding its thickness.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclass 49 for radiant building panel; subclasses 168+ for conduit within, or conforming to, panel or wall structure; and subclasses 172+ for side-by-side tubular structures or tube sections.
- 219, Electric Heating, subclass 528, 548 and 549 for flexible or resilient; subclass 543 for coating printed or deposited on core sheath or support.
- 338, Electrical Resistors, subclass 212 for tape or sheet, and subclasses 306-314 for base extending along resistance element.

**436 Wall or ceiling mounted:**

This subclass is indented under subclass 435. Subject matter wherein the radiant heater panel is readily mounted on a continuous side structure of a room.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclasses 53+ for related to wall, floor or ceiling structure of a chamber.
- 219, Electric Heating, subclass 213 for static structure.

**437 Plural panels:**

This subclass is indented under subclass 436. Subject matter wherein the radiating panel structure includes at least two or more panels.

**438 Heating element formed as coating on radiating panel surface:**

This subclass is indented under subclass 435. Subject matter wherein the heating element is a layer of an electrical resistance material spread over a surface of the radiating panel.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclass 543 for coating printed or deposited on core sheath or support means.

- 338, Electrical Resistors, subclasses 307 through 309 for resistance element coated on base.

**439 Nonmetallic panel:**

This subclass is indented under subclass 438. Subject matter wherein the heating element is coated on a nonmetallic panel.

**440 Multi-direction radiant heat output:**

This subclass is indented under subclass 407. Subject matter wherein the heat generated by the radiant heater is simultaneously guided in two or more directions.

**441 Tank or container type liquid heater:**

This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device includes a vessel for heating liquid therein.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 308, for heating liquid by electricity combined with nonelectric heating means.
- 322, for reservoir or tank type of fluid-in-circuit heater.
- 325, for line connected boiler.
- 333, for manually filled tank or container.
- 341, for fluid heating with heat storage means.
- 377+, for heat exchange fluid.
- 400+, for in-line connected closed tank.
- 402, for in-line connected open tank.
- 403+, for container with self-contained evaporant supply.

**SEE OR SEARCH CLASS:**

- 4, Baths, Closets, Sinks, and Spittoons, subclass 493 for pool type with heating means.
- 119, Animal Husbandry, for residual apparatus to care for a living animal, subclass 73 for a temperature-controlled watering or liquid feeding apparatus.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 344 through 363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace.

**442 Pour-in displacement discharge type tank:**

This subclass is indented under subclass 441. Subject matter wherein the tank has an open inlet through which unheated liquid is poured into the tank to discharge through an open outlet a quantity of heated liquid equal to that poured in.

**443 Flexible container (e.g., water bottle, etc.):**

This subclass is indented under subclass 441. Subject matter wherein the tank or container is made of easily deformable material.

**SEE OR SEARCH CLASS:**

- 5, Beds, subclasses 421+ for heating or cooling of waterbed mattress.
- 126, Stoves and Furnaces, subclasses 204+ for body warmers.
- 165, Heat Exchange, subclass 46 for flexible envelope or cover type.
- 219, Electric Heating, subclasses 528+ for flexible or resilient heater unit housing and subclass 549 for flexible core.
- 383, Flexible Bags, subclass 901 for hot water bags.
- 607, Surgery: Light, Thermal, and Electrical Application, subclass 114 for hot water bags adapted for application to the human body.

**444 Portable container or tank:**

This subclass is indented under subclass 441. Subject matter wherein the container or tank may be lifted or carried bodily from place-to-place by hand.

**SEE OR SEARCH CLASS:**

- 99, Foods and Beverages: Apparatus, appropriate subclasses for various containers adapted for the heating or processing of foods which may be portable.
- 119, Animal Husbandry, subclass 229 for a fish enclosure with a heat exchanger and subclass 262 for an aquarium with a heat exchanger.
- 219, Electric Heating, subclasses 429+ for vessel and stand; subclasses 438+ for vessel; and subclass 533 for portable heater unit with housing, casing or support means.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.

- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for heating or cooling means for the system or system fluid.

**445 Plural compartments:**

This subclass is indented under subclass 444. Subject matter wherein the portable tank structure contains two or more interconnected compartments consisting of at least one heating compartment wherein the liquid to be heated is in heat exchange relationship to a heating device.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 322+, for reservoir or tank.
- 333+, for manually filled tank or container.

**SEE OR SEARCH CLASS:**

- 99, Foods and Beverage: Apparatus, subclasses 279+ for infusers.
- 165, Heat Exchange, appropriate subclasses for compartmented tanks.
- 220, Receptacle, appropriate subclasses for compartmented tanks.

**446 With agitator:**

This subclass is indented under subclass 444. Subject matter wherein the tank or liquid container is provided with means to stir, move or circulate the heated liquid in the tank to maintain a constant uniform temperature condition throughout the entire quantity of liquid.

**SEE OR SEARCH CLASS:**

- 119, Animal Husbandry, subclass 229 for a fish enclosure with a heat exchanger and subclass 262 for an aquarium with a heat exchanger and aerator which may agitate.
- 165, Heat Exchange, subclass 109.1 for agitating or stirring structure.
- 366, Agitating, subclasses 144+ for heating or cooling.
- 432, Heating, subclass 151 for stirrer in externally heated tank.

**447 With internally positioned heating element:**

This subclass is indented under subclass 444. Subject matter wherein the heating device for heating the liquid in the tank or container is placed in a portion of the tank or container receiving the liquid to be heated.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 333+, for manually filled tank or container.
- 403+, for container with self-contained evaporant supply.
- 497+, for immersion heater details.

**SEE OR SEARCH CLASS:**

- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclass 360.1 and 360.2 for a submerged fluid fuel burner other than a top-accessible liquid heating vessel, subclasses 367.1 and 368.1 for a liquid heater having a solid fuel burner submerged underneath the surface of the liquid that may be held in an open-top vessel, subclass 378.1 for an open-top liquid heating vessel that may include a lid having a closed chamber or coiled pipe for a liquid or steam used to heat the liquid, or subclass 391.1 for an open-top liquid heating vessel that may include a lid having a flue penetrating a wall of the vessel into the liquid.
- 219, Electric Heating, subclass 437 for immersible and subclass 523 for housing, casing or support insertable into material or space to be heated.
- 222, Dispensing, subclass 146.1 for heating or cooling means.

**448 Removably inserted through fill opening:**

This subclass is indented under subclass 447. Subject matter wherein the heating element positioned internally of the container or tank may be readily placed into or removed from the tank through a hole through which the quantity of liquid to be heated is poured in the container or tank.

**SEE OR SEARCH CLASS:**

- 119, Animal Husbandry, subclass 229 for a fish enclosure with a heat exchanger and subclass 262 for an aquarium with a heat exchanger.

**449 Line connected tank:**

This subclass is indented under subclass 441. Subject matter wherein the tank or container includes an inlet connected to a pressurized

source of liquid and an outlet for discharging heated liquid from the tank.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 325+, for steam or vapor generator line connected boiler.
- 341, for fluid heating by heat storage means.
- 400+, for line connected closed tank.
- 402, for line connected open tank.

**SEE OR SEARCH CLASS:**

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers.
- 122, Liquid Heaters and Vaporizers, using means other than electricity to generate heat, subclasses 13.01 through 19.2 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.).
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 344 through 363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace.
- 165, Heat Exchange, appropriate subclasses for line connected tank.
- 220, Receptacles, subclasses 62.11+ for multilayer barrier structure, and subclasses 567.3 for hot water boiler type.

**450 Plural serially connected compartments:**

This subclass is indented under subclass 449. Subject matter wherein the tank or container structure contains two or more serially interconnected compartments consisting of at least one heating compartment wherein the liquid to be heated is in heat exchange relationship to the heating device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

322+, for reservoir or tank.

325+, for line connected boiler.

SEE OR SEARCH CLASS:

220, Receptacles, subclasses 500+ for compartmented receptacles.

#### 451 **With immersion heating element:**

This subclass is indented under subclass 449. Subject matter wherein the heating device includes an electrical resistance heating element which is supported within the liquid to be heated.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

322+, for reservoir or tank.

324+, for steam or vapor generator.

401, for line connected closed tank.

497, for details of immersion heater.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclass 360.1 and 360.2 for a submerged fluid fuel burner other than a top-accessible liquid heating vessel, subclasses 367.1 and 368.1 for a liquid heater having a solid fuel burner submerged underneath the surface of the liquid that may be held in an open-top vessel, subclass 378.1 for an open-top liquid heating vessel that may include a lid having a closed chamber or coiled pipe for a liquid or steam used to heat the liquid, or subclass 391.1 for an open-top liquid heating vessel that may include a lid having a flue penetrating a wall of the vessel into the liquid.

#### 452 **With baffle or guard:**

This subclass is indented under subclass 451. Subject matter wherein the immersion heater includes a plate or wall for directing the liquid in a desired flow pattern in the tank.

SEE OR SEARCH CLASS:

122, Liquid Heaters and Vaporizers, using means other than electricity to generate heat, subclass 19.1 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a water containing chamber or external tank including a flow feature within.

126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclass 362.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.) having liquid circulation means or subclass 365.1 for a liquid heater and stovepipe having liquid circulation means.

165, Heat Exchange, appropriate subclasses for baffle or guard.

219, Electric Heating, subclass 523 for housing, casing or support insertable into material or space to be heated.

#### 453 **Removably insertable into tubular receptacle in tank:**

This subclass is indented under subclass 451. Subject matter wherein the heating device may be placed into or removed from a tube shaped water-tight receiver extending into the tank.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

398, for internal heating element for continuous flow line connected heater.

401, for internal heating element for in-line connected closed tank.

487+, for jacket for heating element.

497, for immersion heater details.

503, for particular sheath or jacket composition of immersion heater.

SEE OR SEARCH CLASS:

219, Electric Heating, subclass 523 for immersion type and subclass 534 for rigid tubular housing, casing or support.

338, Electrical Resistors, subclasses 232+ for casing or housing readily openable or separable from element.

**454 Plural heating zones:**

This subclass is indented under subclass 451. Subject matter wherein the heating device is located in at least two or more separate areas of the tank to be heated.

**SEE OR SEARCH CLASS:**

236, Automatic Temperature and Humidity Regulation, subclass 1 for burner control and for multistage controls.

**455 With heating element mounting arrangements:**

This subclass is indented under subclass 451. Subject matter including details of mounting arrangements of the heating element in the tank.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

401, for internal heating element.  
501, for particular mounting means.

**SEE OR SEARCH CLASS:**

219, Electric Heating, subclass 437 for immersible heater; subclass 523 for housing, casing or support insertable into material or space to be heated; subclass 526 for means for attaching housing or casing to an external device; and subclass 536 for heating unit mounting or attaching means.  
338, Electrical Resistors, subclass 228 for casing extending through plate; subclass 229 for probe type; and subclasses 315+ for mountings or supporting means.

**456 With heat exchange fluid:**

This subclass is indented under subclass 451. Subject matter wherein the tank includes a fluid which is heated by the heating element for subsequent transmission of the heat to the liquid to be heated.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

302, for heat exchange fluid used in borehole.

357, for convection space heater using heat exchange fluid.

496, for continuous fluid heater using heat exchange fluid.

**SEE OR SEARCH CLASS:**

122, Liquid Heaters and Vaporizers, using means other than electricity to generate heat, subclass 15.1 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) heated by a liquid or steam (e.g., indirect heating, etc.).

126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 377.1 through 392.1 for an open-top liquid heating vessel that may include a lid having a confining, directing, or shielding feature for a liquid or steam used to heat the vessel.

165, Heat Exchange, subclass 104.11 for intermediate fluent heat exchange material receiving and discharging heat.

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 139+ for spaced jacket or compartment for heating fluid.

252, Compositions, subclasses 67+ for vaporization, or expansion, refrigeration or heat or energy exchange.

338, Electrical Resistors, subclass 231 for incased, embedded, or housed resistors in liquid.

**457 With protecting means against galvanic corrosion:**

This subclass is indented under subclass 451. Subject matter wherein the heating device in-line connected tank includes means to prevent or retard electrochemical corrosion produced when one metal is in electrical contact with another more noble metal, both being in the same corroding medium or electrolyte, with a current between them.

## SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 134.1 for protector or protective agent.
- 204, Chemistry: Electrical and Wave Energy, subclasses 196.01+ for object protection.
- 220, Receptacles, subclass 567.3 for hot water boiler type.

**458 With external heater:**

This subclass is indented under subclass 449. wherein the heating device is located outside of the tank and in heat exchange relation with the liquid to be heated.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 400, for in line connected closed tank.

## SEE OR SEARCH CLASS:

- 119, Animal Husbandry, subclass 73 for a temperature-controlled watering device, subclass 229 for a fish enclosure with a heat exchanger and subclass 262 for an aquarium with a heat exchanger.
- 219, Electric Heating, subclass 424 for protecting means for heating unit or switch; subclass 436 for heating unit attaching or support means; subclasses 438+ for vessel combined with container; and subclass 535 for specially formed or adapted to fit material to be heated.
- 432, Heating, subclass 225 for heat applicator having structure for mounting it on or around object to be heated.

**459 Clamped or secured to tank wall:**

This subclass is indented under subclass 458. Subject matter including a means to fasten or anchor the heating element to the tank wall.

## SEE OR SEARCH CLASS:

- 219, Electric Heating, subclass 536 for heating unit mounting or attaching means and subclass 542 for resistive-element attaching, securing or electrical insulation means.

**460****Producing radiation:**

This subclass is indented under subclass 458. Subject matter wherein the external heater emits heat in the form of electromagnetic waves within the infrared range of spectrum.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 355, for heated by radiant source.
- 391, for vaporization by radiant heat source.
- 407, for electric radiant heater in general.
- 483, for fluid heater producing radiation.

## SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclasses 569+ for solar heat collector.
- 165, Heat Exchange, subclass 133 for coated, roughened or polished surface.
- 250, Radiant Energy, subclasses 493.1+ for infrared radiation generators not provided for elsewhere.
- 432, Heating, subclass 31 for heating of or by wall or radiant surface.

**461****With externally mounted circulation-type heater:**

This subclass is indented under subclass 458. Subject matter wherein the liquid of the tank is heated as it flows through an external flow heater having an inlet for receiving cold liquid from the tank and an outlet for returning heated liquid to the tank.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 322, for reservoir or tank.
- 377, for heat exchange fluid.
- 465+, for continuous flow type fluid heater.
- 471, for combined liquid flow heater and pump unit.
- 479+, for externally heated line connected section.
- 485+, for heated line section with heating element internal of flow path.

## SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, using means other than electricity to generate heat, subclass 18.5 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or



- household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be found in other than a house or home (e.g., apartment building, office building, restaurant, laundry, etc.) having a fluid fueled burner and an external water tank.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 361.1 through 363.1 for a boiler receiving hot liquid or steam from a stove or furnace (e.g., kitchen boiler, range boiler, etc.).
- 165, Heat Exchange, subclass 108 for recirculation and subclass 132 for heating or cooling means in open communication with reservoir.
- 462 Laterally disposed (i.e., side-arm type):**  
This subclass is indented under subclass 461. Subject matter wherein the heater is positioned and connected to a side of the tank.
- 463 With timer controlled energization:**  
This subclass is indented under subclass 449. Subject matter wherein the line connected tank includes means for automatically or manually connecting a source of current or power at regular predetermined times of the day or for predetermined intervals of time.
- SEE OR SEARCH CLASS:
- 99, Foods and Beverages: Apparatus, subclass 327 for automatic control or heating means utilizing timers.
- 165, Heat Exchange, subclass 262 and 266+ for time or program actuators for such systems.
- 219, Electric Heating, subclasses 492+ for automatic power supply, current regulation or current control devices for heaters in general under the class definition and utilizing cycling or timing means.
- 236, Automatic Temperature and Humidity Regulation, subclass 46 for control devices with timing element.
- 237, Heating Systems, subclasses 2+ for automatic control apparatus which may comprise timing means.
- 368, Horology: Time Measuring Systems or Devices, appropriate subclasses for regulating times.
- 464 Off-peak power:**  
This subclass is indented under subclass 463. Subject matter wherein the timer permits energization of the heater at the time of day during which power usage is at a minimum, i.e., off-peak.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
339+, for heat storage means.
- SEE OR SEARCH CLASS:  
307, Electrical Transmission or Interconnection Systems, appropriate subclasses for electrical transmission and interconnection switching systems.
- 327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 365+ for miscellaneous gating circuits.
- 465 Continuous flow type fluid heater:**  
This subclass is indented under subclass 200. Subject matter under Class 219, ... wherein the heating device comprises a flow path for the uninterrupted flow of fluid, either a liquid or gas, to be heated; an inlet connected to a pressurized source of fluid; and an electric resistance heating element arranged in the fluid flow path for heating the fluid while it uninterruptedly flows through the path.
- (1) Note. This subject matter is also known as "in-line fluid heaters", "through flow fluid heaters", and "demand type fluid heaters".
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
314+, for fluid-in-circuit type heater.
- 341, for fluid heating by storage means.
- 357, for fluid heat absorber.
- 396+, for continuous flow line connected heater for vaporizer.
- 461, for externally mounted circulation type heater.
- SEE OR SEARCH CLASS:  
4, Baths, Closets, Sinks, and Spittoons, subclass 598 for shower with heating means.

- 99, Foods and Beverages: Apparatus, subclass 279 for beverage preparing apparatus which may include a continuous flow water heater.
- 122, Liquid Heaters and Vaporizers, appropriate subclasses for liquid heaters of the continuous flow type.
- 123, Internal-Combustion Engines, subclass 142.5 and 545-558 for continuous flow heater associated with internal-combustion engine.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 344 through 363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace.
- 128, Surgery, subclasses 203.26+ for means for heating treating agent, respiratory gas, or mixture thereof and subclasses 204.17+ for electrically heated means producing water vapor.
- 137, Fluid Handling, subclasses 334+ for systems with heating or cooling.
- 138, Pipes and Tubular Conduits, subclasses 32+ for thawing and freezing protection.
- 165, Heat Exchange, appropriate subclasses for continuous fluid heater.
- 210, Liquid Purification or Separation, subclasses 175+ for heater or heat exchanger.
- 219, Electric Heating, subclasses 600+ for inductive heating, note subclass 628 for heat exchange by fluid or liquid; and subclasses 678+ for microwave heating, note subclass 687 for a fluid heater; and subclass 208 for radiator or cooling system.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 13 for heating or cooling and subclasses 128+ for the system fluid with heating or cooling.
- 431, Combustion, subclasses 219+ for heated line feeds steam to fuel basin area.
- D23, Environmental Heating and Cooling; Fluid Handling and Sanitary Equipment, subclasses 314+ for heating or cooling.
- 466 Method:**  
This subclass is indented under subclass 465. Subject matter including processes for heating a continuous flow of fluids (e.g., air or water, etc.) by conversion of electrical energy to heat.
- SEE OR SEARCH CLASS:**
- 34, Drying and Gas or Vapor Contact With Solids, subclasses 283+ for processes of treating hair on head and, particularly, subclasses 443+ for processes of gas or vapor contact with material treated.
- 126, Stoves and Furnaces, subclass 714 for process of heating by using solar heat.
- 165, Heat Exchange, subclasses 1+ for heat exchange processes which may include heating.
- 166, Wells, subclasses 272.1+ for processes of injecting heat into wells.
- 210, Liquid Purification or Separation, subclasses 600+ for processes of liquid purification or separation.
- 222, Dispensing, subclasses 1+ for dispensing processes which may include heating.
- 237, Heating Systems, subclass 12 for process of automatic control of heating systems.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 1 through 13 for processes of fluid sprinkling, spraying and diffusing.
- 431, Combustion, subclass 11 for process of combustion or burner by feeding heat.
- 432, Heating, subclasses 1 through 31 for heating processes and, particularly, subclasses 29 and 30 for fluid heating processes.
- 467 With hot plate:**  
This subclass is indented under subclass 465. Subject matter wherein the continuous fluid heater includes means for supporting a removable vessel to be heated.

## SEE OR SEARCH CLASS:

- 99, Foods and Beverages: Apparatus, subclasses 275 through 323 for beverage heaters utilizing a continuous flow heater which may include a hot-plate.
- 126, Stoves and Furnaces, subclasses 4+ for cooking and heating stove.
- 219, Electric Heating, subclasses 429+ for a heating device combined with a vessel or stand, or subclasses 443.1+ for an exposed planar support surface for material to be heated (e.g., hot plate, etc.).
- 222, Dispensing, subclass 146.1 for heating or cooling means.

**468 Pipeline tracing:**

This subclass is indented under subclass 465. Subject matter wherein the heating device comprises the entire length of a pipeline carrying the flow of fluid which is heated by a linearly extending electrical resistance heater coextensive with the exterior of the pipeline length.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 472, for flexible fluid heater.
- 479+, for heated line section with heating elements external of flow path, particularly 480-482 for a pipe or tube forming flow path.
- 485+, for heated line section with heating element internal of flow path.
- 486, for plural pipes or tubes form flow path.
- 488+, for pipe or tube forms flow path.

## SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 301+ for hydrant with freeze protection which may include a heater and subclasses 334+ for systems with heating and cooling.
- 138, Pipes and Tubular Conduits, subclasses 32+ for thawing and freezing protection.
- 219, Electric Heating, subclass 522 for housing, casing, or support performing plural diverse functions and subclass 535 for a pipe to be heated.

- 222, Dispensing, subclasses 146.1+ for a device with heating or cooling means.

- 469 Skin-effect heater type (e.g., S.E.C.T., etc.):**  
This subclass is indented under subclass 468. Subject matter wherein the resistance heating element of the pipeline length is accomplished by the flow of alternating current through the walls of a ferromagnetic pipe, and the current flow is confined to the interior of the ferromagnetic pipe.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 478, for fluid conveying tube or pipe comprising resistive heating element.
- 480+, for pipe or tube forms flow path.

## SEE OR SEARCH CLASS:

- 138, Pipes and Tubular Conduits, subclass 33 for electric thawing and freezing protection.
- 174, Electricity: Conductors and Insulators, appropriate subclasses for electrical conductors or conduits.

- 470 Disposable cartridge, tube or bag forms heated flow path (e.g., blood bag, etc.):**  
This subclass is indented under subclass 465. Subject matter wherein the flow path comprises a hollow cylinder, sack, case or shell which can be readily removed and replaced after use.

- (1) Note. The disposable cartridge, tube or bag may be a blood bag.

## SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 46 for flexible envelope or cover type.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.
- 604, Surgery, subclass 113 and 114 for means for heating body treating material or device and subclasses 403+ for containers for body treating materials.

- 471 Combined liquid flow heater and pump unit:**  
This subclass is indented under subclass 465. Subject matter wherein the fluid flow heater includes a hydraulic machine for creating a continuous flow of liquid combined with the fluid heating means in a common enclosure.

- (1) Note. The pump may be a mechanical pump, vapor pump, ejector pump, etc.

**SEE OR SEARCH CLASS:**

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers.
- 165, Heating Exchange, subclass 108 for recirculation and subclasses 120+ for impeller or conveyor moving exchange material.
- 166, Wells, subclass 62 for eduction pump or plunger in well.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for heating or cooling means for these systems or system fluid.
- 417, Pumps, subclass 208 for pumps by heating of pumped fluid.

**472 Flexible (e.g., hose, etc.):**

This subclass is indented under subclass 465. Subject matter wherein the flow path is formed by a pipe or passage made of a deformable material which is capable of being bent.

**SEE OR SEARCH CLASS:**

- 138, Pipes and Tubular Conduits, subclasses 32+ for thawing and freezing protection and subclasses 118+ for flexible pipes.
- 174, Electricity: Conductors and Insulators, subclass 47 for combined fluid conduit and electrical conductor.
- 219, Electric Heating, subclass 547 for particular material to be heated.

**473 Fluid heater carried on discharge member:**

This subclass is indented under subclass 465. Subject matter wherein the heat is supported on a member defining a passage or vent for escaping or discharging a fluid from a supply line or a reservoir.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

379+, for concentrated air stream.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 334+ for systems with heating or cooling.

- 219, Electric Heating, subclass 214 for vending, dispensing or display devices.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for means for heating or cooling the system or fluid.
- 401, Coating Implements With Material Supply, subclasses 1+ for means to impart heat to material.
- 425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 547+ for means to heat or cool.
- 604, Surgery, subclass 113 and 114 for means for electrically cooling or heating body.

**474 With flow control valve (e.g., faucet, etc.):**

Subject matter under 473 wherein the discharge member is provided with a valve operable to control the rate of fluid flow through the discharge member.

**475 Valve turns heating element on and off:**

This subclass is indented under subclass 474. Subject matter wherein the valve is arranged to actuate an electrical control means to turn the heating element on and off in synchronism with the opening and closing of the valve.

**SEE OR SEARCH CLASS:**

- 200, Electricity: Circuit Makers and Breakers, subclasses 61.80+ for fluid controlling valve.

**476 Hand-held discharge member:**

This subclass is indented under subclass 473. Subject matter wherein the discharge member is to be held in the hand.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 383+, for portable heater for concentrated heated air stream.
- 404, for hand-held container with self-contained evaporant supply.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclass 214 for vending, dispensing or display device and subclass 230 for tip cooling, clamping or lighting means.

- 222, Dispensing, subclass 146.1 for heating or cooling means.
- 607, Surgery: Light, Thermal, and Electrical Application, subclasses 104+ for thermal applicators with fluid supply and subclass 113 for internal applicator.
- 477 With storage container for fluid to be heated:**  
This subclass is indented under subclass 476. Subject matter wherein the hand-held discharge member is provided with a container or reservoir for the fluid to be heated.
- SEE OR SEARCH CLASS:
- 228, Metal Fusion Bonding, subclasses 52+ for metal heat applicator.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for heating or cooling means for the system or system fluid and subclasses 133+ for spray terminal carrying member carriers heater.
- 401, Coating Implements With Material Supply, subclasses 1+ for means to impart heat to material.
- 478 Fluid conveying tube or pipe comprising resistive heating element:**  
This subclass is indented under subclass 465. Subject matter wherein the flow path through the fluid heater is formed by a conduit made of an electrically resistive material having at least two points thereon connected to a source of electricity whereby the conduit itself comprises the resistive heating means for heating the fluid.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 341 for heating or cooling of the system by electric heating element.
- 138, Pipes and Tubular Conduits, subclass 33 for thawing and freeze protection by electricity.
- 219, Electric Heating, subclass 547 for particular material to be heated.
- 222, Dispensing, subclass 146.1 for heating or cooling means.
- 479 Externally heated line connected section:**  
This subclass is indented under subclass 465. Subject matter wherein the fluid heating device comprises means defining a closed flow path having an inlet and an outlet, an electric resistance heating element externally of the flow path arranged to heat the fluid flowing there-through, and means at the inlet and outlet of the flow path for coupling the heating device into a fluid flow line as a part thereof.
- (1) Note. The heating element may be secured or coupled in any heat conductive manner to the external surface of the heated line section.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 396, for in continuous flow line connected vaporizer.
- 473, for fluid heater carried on discharge member.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclass 357.1 for a fluid fuel burner other than a top-accessible liquid heating vessel and a separable heat exchanger to heat the liquid or subclass 392.1 for an open-top liquid heating vessel that may include a lid where the liquid circulates between an external heating tube and the vessel.
- 137, Fluid Handling, subclasses 340+ for circulation fluid in heat exchange relationship.
- 138, Pipes and Tubular Conduits, subclasses 32+ for thawing and freeze protection.
- 219, Electric Heating, subclass 535 for a pipe to be heated.
- 222, Dispensing, subclasses 146.1+ for molten metal dispensing with heating.
- 431, Combustion, subclass 208 for electrically heated section.
- 480 Pipe or tube forms flow path:**  
This subclass is indented under subclass 479. Subject matter wherein the flow path for the fluid to be heated comprises a fluid conveying elongated hollow cylinder.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 304, for heating element surrounding delivery pipe.
- 320+, for fluid-in-circuit type heater.
- 397+, for continuous flow line connected heater for vaporizer.
- 461, for externally mounted circulation type heater.
- 468+, for pipeline tracing.
- 470, for disposable cartridge, tube or bag forms heated flow path.
- 472, for hose type heater.
- 482, for plural pipes or tubes forms flow path.
- 486+, for heated line section with heating element internal of flow path.

SEE OR SEARCH CLASS:

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.

#### 481 Coiled:

This subclass is indented under subclass 480. Subject matter wherein the tube or pipe is in the form of a spiral or helix.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 320, for tube or pipe forms flow path.
- 396+, for continuous flow line connected vaporizer.
- 461, for externally mounted circulation type heater.
- 468+, for pipeline tracing.
- 472, for flexible hose.
- 480+, for pipe or tube forms flow path.

SEE OR SEARCH CLASS:

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers.
- 122, Liquid Heaters and Vaporizers, subclasses 244 through 251 for oil or loop tube.
- 219, Electric Heating, subclass 535 for specially formed or adapted to fit material to be heated.
- 222, Dispensing, subclasses 146.1+ for heating or cooling means.

- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for heating or cooling means for system or system fluid.

#### 482 Plural pipes or tubes form flow path:

This subclass is indented under subclass 479. Subject matter wherein the flow path for the fluid to be heated comprises at least two or more fluid conveying hollow cylinders.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 320+, for tube or pipe forms flow path in fluid-in-circuit heater.
- 461, for externally mounted circulation type heater.
- 468+, for pipeline tracing.
- 472, for flexible hose.
- 478, for fluid conveying tube or pipe comprising resistive heating element.

#### 483 Heating element producing radiation:

This subclass is indented under subclass 479. Subject matter wherein the the external heater has an electrical resistance heating element which emits heat in the form of electromagnetic waves within the infrared range of spectrum.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 355, for intermediate heat absorber
- 391, for vaporizer using radiant heat source.
- 407+, for radiant heater.
- 460, for external heater producing radiation.
- 468, for pipeline tracing.
- 470, for disposable cartridge, tube or bag forming flow path.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 344 through 363.1 for a liquid heater that may include a kettle, a steam generator, stove pipe for use with a stove, a domestic water heater or boiler (e.g., kitchen boiler, range boiler, etc.) for use with a stove or furnace or subclasses 569-713 for a solar heat collector.

- 165, Heat Exchange, subclass 133 for coated, roughened or polished surface.
- 219, Electric Heating, subclasses 600+ for inductive heating, note subclass 628 for heat exchange by fluid or liquid, and subclasses 678+ for microwave heating, note subclass 687 for a fluid heater.

**484 Block forms flow path:**

This subclass is indented under subclass 479. Subject matter wherein the flow path is formed in a solid mass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 467, for hot plate.
- 494, for heated line section with heating element internal of flow path.

SEE OR SEARCH CLASS:

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for heating or cooling means for the system or system fluid.

**485 Heated line section with heating element internal of flow path:**

This subclass is indented under subclass 465. Subject matter wherein the fluid heating device comprises means defining a closed flow path having an inlet and an outlet, an electrical resistance heating element disposed in the flow path and arranged to heat the fluid flowing therethrough, and means at the inlet and outlet of the flow path for coupling the heating device into a fluid flow line as part thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 301+, for borehole type.
- 320+, for tube or pipe forming flow path.
- 341+, for fluid heating.
- 396, for in continuous flow line connected vaporizer.
- 461, for externally mounted circulation type heater.
- 468, for pipeline tracing.
- 473, for fluid heater carried on discharge member.
- 497, for immersion heater details.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 340+ for circulation fluid in heat exchange relationship and subclass 185 for gas collecting float.
- 138, Pipes and Tubular Conduits, subclasses 32+ for thawing and freeze protection.

**486 Plural pipes or tubes form flow path:**

This subclass is indented under subclass 465. Subject matter wherein the flow path for the fluid to be heated comprises two or more fluid conveying hollow cylinders.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 314+, for continuous flow of fluid being heated.
- 468+, for pipeline tracing.
- 472, for flexible hose.
- 478, for fluid conveying tube or pipe comprising resistive heating element.
- 482, for plural pipes or tubes forming flow path.

**487 With jacket for heating element:**

This subclass is indented under subclass 485. Subject matter wherein the heating element is enclosed by an outer protective covering.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 489, for single pipe or tube forming flow path.
- 503, for particular sheath or jacket composition of immersion heater.

SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 177+ for tubular structure.
- 219, Electric Heating, subclass 437 for immersible heating unit attaching or support means; subclass 520 for heater-unit housing, casing or support means; subclass 523 for housing, casing or support insertable into material or space to be heated; subclass 534 for rigid tubular housing, casing or support; subclass 544 for element imbedded within or completely surrounded by core, sheath or support means; and

- subclass 548 for particular construction or material.
- 338, Electrical Resistors, subclasses 226+ for incased, embedded, or housed.
- 488 Pipe or tube forms flow path:**  
This subclass is indented under subclass 485. Subject matter wherein the flow path for the fluid to be heated comprises a fluid conveying elongated hollow cylinder.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 308, for heating fluid with non-electric heating means.  
397, for pipe or tube forming flow path.  
470+, for disposable cartridge, tube or bag forming heated flow path.  
472, for flexible hose.  
478, for fluid conveying tube or pipe comprising resistive element.  
480+, for pipe or tube forming flow path for continuous fluid heater.  
482, for plural pipes or tubes forming flow path.
- 489 With jacket for heating element:**  
This subclass is indented under subclass 488. Subject matter wherein the heating element is enclosed by an outer protective covering.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 487, for plural pipe or tube forming flow path.  
503, for particular sheath or jacket composition of immersion heater.
- 490 Plural heated line sections (e.g., series or parallel, etc.):**  
This subclass is indented under subclass 485. Subject matter including two or more separate heated line sections in series or parallel arrangement.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 486, for plural pipes or tubes forming flow path.
- 491 With baffle-defined flow path:**  
This subclass is indented under subclass 485. Subject matter wherein the flow path is provided with a member or members in the flow path for guiding and directing the flow with respect to the inlet or outlet thereof.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 368+, for portable forced air type heater with baffle.  
374, for portable convection space heater with baffle.  
379+, for concentrated heated air stream heater.
- 492 Producing counterflow circulation:**  
This subclass is indented under subclass 491. Subject matter wherein the baffle is arranged to reverse the direction of fluid flow flowing through the flow path at least once between the inlet and the outlet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 351, floor furnace type heater.  
369, for counterflow of convection space heater.
- 493 Heating element integral with baffle:**  
This subclass is indented under subclass 492. Subject matter wherein the baffle includes the heating element as a unitary part of the baffle to define flow path and heat up the fluid.
- 494 Block forms flow path:**  
This subclass is indented under subclass 485. Subject matter wherein the flow path is formed in a solid mass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 467, for hot plate.  
484, for externally heated line connected section.
- 495 Plural different fluids simultaneously heated:**  
This subclass is indented under subclass 465. Subject matter wherein the heating device includes separate distinct flow paths for simultaneously heating at least two or more different fluids.
- SEE OR SEARCH CLASS:
- 431, Combustion, subclasses 210+ for heated section supplied by separate diverse feeds.



- 604, Surgery, subclasses 113+ for means for cooling a heating body, treating or collected material or device.

**496 With heat exchange fluid:**

This subclass is indented under subclass 465. Subject matter wherein the heating device includes a fluid which is heated by the heating element for subsequent transmission to the flow path for heating up the continuous flow of fluid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 302, for borehole type.  
344, for convection space heating in heat storage.  
357+, for fluid heat absorber.  
377, for convection combined with radiation.  
456, for heat exchange fluid line connected heated storage tank.

SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, using means other than electricity to generate heat, subclass 15.1 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) heated by a liquid or steam (e.g., indirect heating, etc.).  
126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclasses 377.1 through 392.1 for an open-top liquid heating vessel that may include a lid having a confining, directing, or shielding feature for a liquid or steam used to heat the vessel.  
165, Heat Exchange, subclasses 104.11+ for intermediate fluent heat exchange material receiving and discharging heat.  
239, Fluid Sprinkling, Spraying, and Diffusing, subclass 139 for spaced jacket or compartment for heating fluid.

- 252, Composition, subclasses 67+ for vaporization, or expansion, refrigeration or heat or energy exchange.  
338, Electrical Resistors, subclass 231 for electrical resistors in liquid.

**497 Immersion heater details:**

This subclass is indented under subclass 200. Subject matter under Class 219, ... including details of an electrical resistance heating element which is supported within liquid to be heated.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 301+, for borehole type.  
357+, for fluid heat absorber.  
377+, for heat exchange fluid.  
398, for internal heating element.  
401, for line connected closed tank.  
447+, for internally positioned heating element.  
451+, for immersion heating element.  
471, for liquid heater with pump unit.  
473+, for fluid heater carried on discharge member.  
485+, for heated line section with heating element internal of flow path.

SEE OR SEARCH CLASS:

- 99, Foods and Beverages: Apparatus, subclasses 279+ for infusers and subclasses 401+ for heat distributor, baffle or enclosure.  
119, Animal Husbandry, subclass 73 for a temperature-controlled watering device, subclass 229 for a fish enclosure with a heat exchanger and subclass 262 for an aquarium with a heat exchanger.

**498 With thermostatic control means:**

This subclass is indented under subclass 497. Subject matter wherein the immersion heater includes an electrical control means for controlling the temperature of the liquid to be heated between predetermined upper and lower limits or at or above predetermined lower limit

SEE OR SEARCH CLASS:

- 119, Animal Husbandry, subclass 73 for watering troughs with liquid temperature control means.

- 219, Electric Heating, subclass 437 for immersible heating unit; subclasses 510+ for thermally responsive means; and subclass 523 for housing, casing or support insertable into material or space to be heated.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclass for automatic temperature control systems.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 298+ for thermally actuated switches.

**499 Buoyant in liquid:**

This subclass is indented under subclass 497. Subject matter wherein the heater includes means capable of keeping the heater afloat in the liquid.

**SEE OR SEARCH CLASS:**

- 119, Animal Husbandry, subclass 73 for temperature controlling water devices.
- 126, Stoves and Furnaces, for general heat applying apparatus having other than electrical heating means, subclass 367.1 and 368.1 for a liquid heater having a solid fuel burner submerged underneath the surface of the liquid that may be held in an open-top vessel and float in the liquid or subclasses 373.1-390.1 for a liquid heater having an open-top vessel that may include a lid and float in the liquid.

**500 With plural heating elements:**

This subclass is indented under subclass 497. Subject matter wherein the heater includes two or more immersed heating elements.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclasses 476+ for plural separate heating devices; subclass 523 for housing, casing or support insertable into material or space to be heated; subclass 537 for heating units combined with single casing, housing or support; and subclass 539 for heating unit structure comprising plural separate and distinct resistive elements.
- 338, Electrical Resistors, subclasses 260+ for plural resistors and subclasses

319+ for plural resistors extending between supports.

**501 With particular mounting means:**

This subclass is indented under subclass 497. Subject matter wherein the heater includes means for rigidly attaching the heater to a liquid container or tank.

**SEE OR SEARCH CLASS:**

- 219, Electrical Heating, subclass 526 for means for attaching housing or casing to an external device; subclasses 536+ for heater unit attachment means for heater housings in general; and subclasses 542+ for significant heating unit structure adapted for use with the heating device under the class definition and including significant resistive element attaching, securing, or insulation means.
- 338, Electrical Resistors, subclasses 228+ for casing extending through plate; and subclasses 315+ for resistance devices combined with mounting or supporting means.

**502 Having positive temperature coefficient:**

This subclass is indented under subclass 497. Subject matter wherein the resistance heating element of the immersion heater increases its resistance as the temperature increases.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclasses 504+ for variable resistance means and subclasses 552+ for heating element structure.
- 338, Electrical Resistors, subclasses 22+ for thermistor type and subclasses 25+ for ambient temperature.
- 374, Thermal Measuring and Testing, subclasses 183+ for current modifying sensor and, particularly, subclass 185 for detail of resistive sensor.

**503 Particular sheath or jacket composition:**

This subclass is indented under subclass 497. Subject matter wherein the heater includes parts or elements to form an outer, protective covering applied over the heating element.

## SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclasses 177+ for tubular structure.
- 219, Electric Heating, subclass 437 for immersible heating unit attaching or support means; subclasses 520+ for heat-unit housing, casing or support means; subclass 534 for rigid tubular housing, casing or support; subclass 544 for element embedded within or completely surrounded by core, sheath or support means; and subclass 548 for particular construction or material of core, sheath or support.

END